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THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

PUBLISHED BY

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FIRE-PROOF construction in this country may be said to have had a spontaneous and quite recent creation, due to commercial necessity rather than constructive choice. As a nation, we seem to prefer or at least be satisfied with wood as a building material for ordinary constructions, until a conflagration teaches us financial lessons which cannot be ignored. In other words, fire-proofing is an expedient with us rather than a fundamental matter of course. As a result, the systems adopted for the protection of buildings against fire have been largely of a tentative nature, and, with a few notable exceptions, there has been an absence of deliberate investigation on the part of our constructors which is quite noticeable. The present systems of fire-proofing practically arose as a result of the great Chicago fire in 1871, and when it is remembered that in the whole of New England there is, so far as we know, only one fire-proof hall of audience, and that outside of the larger cities a fire-proof structure is seldom even thought of, it will readily be appreciated that, though fire-proofing as a science has reached a point where it is upon perfectly firm ground, the construction itself is by no means universal. The public is apt to be skeptical on the subject of fire-proof buildings, chiefly, however, from ignorance. Whenever a large commercial building goes up in smoke the daily papers are sure to come out with reference to it as "another fire-proof building which was not fire-proof." The few actual tests of fire-proof materials which were not made by parties interested in selling some particular system of fire-proofing have been admirable in as far as they have gone. In New York a joint commission has recently been appointed including some of the most prominent architects, constructors, and representatives of the city government, by whom it is hoped a series of practical and conclusive tests will be made to demonstrate the absolute resisting qualities of the various devices which are now in the market. It would seem to be quite within the scope of a municipality to undertake such works as these. Tests properly conducted with impartial judges would give an impetus to the fire-proofing industries such as they could receive in no other way, and would, besides, enable the building public to know what is in the market and what it is good for. It may truly be said, however, that, though the conditions governing the application of fire-proof construction are quite different in New York, Chicago, Boston, and Philadelphia, there is yet to be an instance on record of a structure which was thoroughly fire-proofed according to the laws of either one of these cities which has been materially injured by conflagration; and the reasonable inference is that, though our fire-proofing methods are still quite crude in detail and are limited in variety of applications, they are correct in principle. The outcome of the experiments which the New York commission will make will be watched with a great deal of interest. We ought to fire-proof our dwellings, as well as our public buildings, and when our constructors can look beyond the first cost, and consider more the ultimate endurance and capabilities of a building which cannot be consumed, it will not need the object lesson of a great conflagration or an expensive fire department to stimulate the fire-proofing industries to the devising of a system of construction which will be within the reach of all who build.

THE brilliant series of articles by Edward Weeks, the artist, which have been published in *Harper's Monthly* ought to be read with a great deal of very keen pleasure by every one who has had a hand in even the slightest attempt to introduce decorative features in color or in form into our modern buildings. The office building as a problem seems almost hopelessly removed from the Taj Mahal or the mosque of Futtipoor Sikri, and yet in a sense there surely can be some very valuable lessons drawn from these dream-like palaces, capable of being applied directly to our commercial structures, which, homely and uninteresting as they sometimes are, can, nevertheless, offer opportunities for external treatment which unfortunately we have been all too slow to grasp. If there is any department of building in which faience should find an appropriate expression it is in the modern office building, — a structure which is primarily made for use, which theoretically eschews every feature which will not last and keep clean, and which, at the same time, may, within natural limits, be made a thing of beauty. We all know the unsatisfactory results attained by color in any material which will hold a deposit of soot or dust, and although we would not say that the entire surface of a building could advisably be covered with enameled terra-cottas or faience, the highly polished material could certainly be used in places with very good effect. Probably nowhere in the world has color been used so lavishly and on the whole so successfully for external effects as in India; and, although we cannot put the glories of the Taj about the setting of an office building, we can get ideas from such beautiful, poetic coloring, which, if they could be translated through the medium of our modern faience into architectural forms, might easily introduce a revolution in public taste which would be very far reaching in its

influence. We, as a nation, are afraid of color; we use it timidly or in an apologetic manner, chiefly because we don't know how; but the colored terra-cottas have certainly prepared the way for the more vivid colorings of faience, and, once started on the right track, there would seem to be no esthetic or commercial reason why our buildings growing up from a sober basement of stone or iron should not blossom out in the upper stories with a burst of color treatment which would be a fitting crown to the structure. It is better to be bold even to rudeness than to be merely timidly crude, and we hope some designer will arise with the courage to roll up his sleeves and give us some color treatment that will be real color and not mere application of colored material.

ONE of the indirect results of the use of the skeleton construction which has become so common in connection with building operations throughout this country has been to call attention to the inefficient manner in which ordinary brick buildings are secured against lateral motion. A case in point is a building about 90 by 60, built of brick, carried up through four stories, and with two lines of girders at right angles to the front of the building. The construction consists simply of posts superimposed upon one another with projecting iron caps carrying the girders of each floor. The floor beams are loosely tied together with iron clamps, but, although the walls run from 20 ins. in the first story to 16 ins. in the upper, the question of how strong such a building would be against a sudden jar sidewise is something which is not easy to determine. Probably, if the side wall could be started enough to get a little off its center gravity, the whole building would collapse like a pack of cards, and there would be another startling notice in the journals calling attention to such horribly bad construction; whereas, in reality, the building is constructed exactly on the lines of thousands of structures all over the country, and, were it not for the absolute necessity of lateral bracings which the skeleton construction has manifested, it is doubtful if any one would think of condemning such a method of building.

A brick wall, in the eyes of a great many builders, will stand about all that can be put upon it, and one seldom takes into account the limits of its resistance to lateral motion. We are pretty well informed at present upon the resistance of brickwork to vertical compression, but we know practically nothing of the lateral strength of a wall. In taking down a building recently in Boston, the walls were found to be some 3 ft. thick outside, but with two hollow spaces, the whole being so slightly bound together that when truss plates, weighing perhaps a thousand pounds each were lowered over one edge of the wall it was pulled out of plumb nearly 5 ins. It would seem as if it would be possible to make some experiments with the numerous old brick buildings which are being torn down nearly every day and ascertain by actual tests how much force would be required to throw a wall of certain thickness and height sufficiently off its center of gravity to cause its collapse. Such data is very seldom collected and would be of great value.

Suggestions in Brickwork, with illustrations from the architecture of Italy, together with a catalogue of brick made by the Hydraulic-Press Brick Company. — Although primarily a trade catalogue, this publication of the Eastern Hydraulic-Press Brick Company, of Philadelphia, deserves more than a passing mention for its intrinsic interest and excellence. It is certainly the most complete and the most suggestive brick catalogue that has come under our notice. We should not be at all surprised to see it produce a marked improvement in the architecture of small towns and outlying districts, East and West, which are somewhat outside of the sphere of influence of the large cities,— places to which the trained architect has rarely found his way. To the architect, also, this book of plates will be full of helpful suggestions. Besides the "catalogue of shapes," there are a series of excellent "suggestions in design," showing how these moldings may be applied in windows and doors, arcades, cornices, fireplaces, etc. All the designs shown are good. The pages are further embellished by a series of half-tone reproductions from photographs of the best Italian brickwork. These have been selected with excellent judgment by Mr. Frank Miles Day (to whom, doubtless, are to be ascribed, also, the suggestions in design), and add not a little to the attractiveness and value of the book. The company is to be congratulated on having been able to secure so excellent a designer to direct their enterprise. In the profiles themselves we notice some additions and some improvements. The square bonding brick and the great variety of panel-miters will be especially useful. Taken as a whole, the catalogue in all its essential features marks a most decided advance.

IN the William Connors competition the judges awarded the prizes as follows: First prize, Pierre A. Liesch, Boston; second prize, H. F. Lehr, Allentown, Pa.; third prize, Charles Wierbach, Allentown, Pa.; first mention, Charles Wierbach, Allentown, Pa.; second mention, James C. Green, New York City; third mention, Edwin R. Clark, Lowell, Mass.

The following is the report of the committee: —

TO THE EDITOR OF THE BRICKBUILDER: —

Dear Sir,— Although there were thirty-four designs submitted for the American Seal Mortar Color advertisement, the members of the jury, working entirely apart from one another, have arrived at the same opinion with regard to the placing of the three prize designs. These are as follows: —

The design marked S. P. Q. R. is entitled to the first prize. This drawing is good as an advertisement, and, what is more, good art. The lettering is clearly and carefully drawn, though the division of the word "easily" is incorrect. This, however, could readily be rectified, and, indeed, the spacing of the line below would then be bettered. Making the struts of the scaffolding appear in the drawing is a very ingenious and pleasing device, and the line throughout is uniformly excellent.

The design submitted by "James" for the second prize is distinctly inferior to the first design in every way, and lacks all of the interest which the first possesses; neither is it so well drawn, the ink being gray and the line poor; nevertheless, there is considerable ingenuity displayed in the form of the cartouche, although the lettering is brought too near the ends to be as conspicuous as it would have been had more margin been allowed. The floret at the top of the inscription is exceedingly bad, and the lions have no apparent reference to the subject. Nevertheless, there is a good deal of dash shown in the drawing, and it will more than hold its own with the other advertisements printed around it, without a doubt.

For the third prize the design marked "Sir Christopher." The figures in this design are good, though, if we are not mistaken, "Sir Christopher" has shown a lack of knightly qualities in using poses which seem so familiar, though we are unable to place their original positions exactly. The lettering, although of an irregular sort, is distinctly good. The strings of the lyre coming as they do against the frame surrounding the inscription is unfortunate, and might have been avoided. With less familiarity with the T square and more artistic feeling, the draughtsman would have slanted the lyre diagonally across the frame.

In addition to these prize designs, the jury commends for first, second, and third honorable mention the designs marked, "Sir Christopher" (2d), "A Mason's Trowel," and "Bay."

The effect of the ornament in the design to which we award first mention is very good, but would be much bettered by reduction. The lettering is, if anything, better than in "Sir Christopher's" third prize design, but the ink is gray, and will need careful process work.

The second mentioned design is extremely good and very clear, as also is the third. These are apparently by the same draughtsman, and there is little to choose between them, for, while "Bay's" lettering is better drawing, the interest of the design marked with a trowel is considerably greater.

It has been an easy matter in this competition to reach a result, for, while there are many clever drawings among the rest, there are none which artistically can compare with the above.

Respectfully submitted by

BERTRAM G. GOODHUE,
D. A. GREGG,
R. CLIPSTON STURGIS.

OUR ILLUSTRATED ADVERTISEMENTS.

A VERY successful ten-story office building is now approaching completion on Broadway, New York City, and of which Mr. John T. Williams is architect and building owner. The three first stories are of stone, the next five of terra-cotta and brick, and the two last are executed wholly in terra-cotta. A portion of the latter composition is made the subject of illustration by the New York Architectural Terra-Cotta Co., on page xxi. The color is a light gray so uniform in shade and so good a match for the Indiana limestone that it is difficult to draw a line of demarcation between them.

Unskilful and slovenly setting have always been and is still a grievous drawback to the complete success of terra-cotta work. It has often been the cause of adverse and unmerited criticism being directed against the material itself, however perfectly each block may have been made and fitted and delivered on the site. We take pleasure in noting that such has not been the case here, and that the care and forethought displayed in the setting and cleaning down reflects much credit on the men entrusted with these vitally important duties.

The adjoining capital and panel has been selected from among the details used on this building.

The subject for this month's illustration in the advertisement of the Celadon Terra-Cotta Co., Charles T. Harris (lessee), see page vi., is of the Pullman Memorial Church, Albion, New York; S. S. Beeman, of Chicago, architect.

In the new advertisement of Stephens & Co. (see page ix) is illustrated a panel executed in terra-cotta for the residence of Mrs. George W. Childs, Washington, D. C., of which Furness, Evans & Co. are the architects. The panel was modeled by Karl Bitter.

The Atwood Faience Co. show in their advertisement, on page xix, another beautiful mantel executed in faience.

IN the New York Architectural Terra-Cotta Competition for a design for a full-page advertisement the judges awarded the prizes as follows: First prize, James C. Green, New York City; second prize, Edwin R. Clark, Lowell, Mass.; third prize, Will S. Aldrich, Boston; fourth prize, D. C. Meyers, Williamsport, Penn. First mention, Pierre A. Liesch, Boston, Mass.; second mention, E. P. Bissell, Philadelphia, Penn.; third mention, F. S. Swales, Rochester, N. Y.; fourth mention, Wm. Louis Goeltz, Long Island City, N. Y. Report of the judges: —

TO THE EDITOR OF THE BRICKBUILDER:

Dear Sir, — The committee appointed to award the prizes offered by the New York Architectural Terra-Cotta Co. for the best design for an advertising page in THE BRICKBUILDER beg to submit the following report.

The drawings have been ranked in the order in which they are mentioned.

The first prize is given to "Ghiberti." He seems, better than any one else, to have combined the qualities of artistic excellence and an element of conspicuousness, which legitimately belongs to a design for advertising purposes. If all the drawings submitted were scattered over the floor, "Ghiberti" would be one of the first which the eye would rest upon as distinguished from its neighbors. Its quality of distinction is undoubtedly in some respect due to the employment of a black background, but it results also from the scale of the design and the simplicity of its conception. The drawing is free and intelligent, although not particularly refined. The space left for illustration in the center is a good feature, which is also employed by the author of the design placed second.

The second design is marked "I. X. L.," and is conspicuous, among all the designs submitted, for the remarkable beauty of draughtsmanship displayed in it. Such an admirable handling of the pen is seldom found, and we commend the drawing particularly to all architectural draughtsmen as a brilliant sample of clean, intelligent, and artistic rendering. The design proper is a very agreeable one, although not so strictly a design for a flat page as "Ghiberti's." Its many fine qualities, however, have given it the second rank.

"1144," placed third, is, like the prize winner, an example of the right sort of treatment for decorative design. It is, however, badly balanced in respect to the scale of the various portions, the ornamentation being too delicate for the lettering. The drawing of the figures also is defective, while the eccentricity of the lettering takes away from the dignity of the whole.

Design placed fourth is marked by a "Wreath and Torch." This is, properly speaking, not a design, but a geometrical elevation of a piece of architecture with the lettering incorporated. It has the merit of presenting the name of the advertising firm clearly and unmistakably, and also the merit, such as it is, of suggesting, by the jointing of the design, the employment of decorative terra-cotta.

Design placed fifth is marked by "Dolphins." This is also an admirable piece of pen drawing, although not nearly as good as No. 2. Its conspicuous fault is that it is not an advertisement, the name of the advertising firm occupying a very small portion of the space; nor is the design in itself particularly pleasing.

No. 6, marked by an "Owl," is pretty and sets forth the firm name with distinctness, but the scale of the ornament is rather too small and the top and bottom pieces are conspicuously thinner in effect than the side pieces, so that the frame which is attempted is not completely realized.

No. 7, submitted by "Haste," has the merit of drawing attention, and is better in scale than many submitted; yet, in our opinion, it attempts too much. Figure drawing in these days must be attempted only by a master.

No. 8, marked "A. D. V. T.," is a painstaking and laborious effort, to which the criticism just made in regard to figures applies. This is not a design for the decoration of a page, but for a piece of actual terra-cotta work, and not a very successful design at that. The whole, however, makes an effective frame for the insertion of a picture, and serves to suggest the nature of the wares advertised.

ROBERT D. ANDREWS,
C. HOWARD WALKER,
EDMUND M. WHEELWRIGHT,
Judges.

AT the Annual Convention of the American Institute of Architects, held in St. Louis in October, the following list of officers was chosen: George B. Post, of New York, President; Henry Van Brunt, of Kansas City, First Vice-President; Wm. C. Smith, of Nashville, Second Vice-President; Alfred Stone, of Providence, Secretary; S. A. Treat, of Chicago, Treasurer; and D. H. Burnham, of Chicago, J. W. McLaughlin, of Cincinnati, W. S. Eames, of St. Louis, C. F. McKim, of New York, F. M. Day, of Philadelphia, N. S. Patton, of Chicago, R. D. Andrews, of Boston, as Directors for three years. Mr. W. R. Briggs, of Bridgeport, was elected a Director *vice* Van Brunt promoted.

THE PEN-DRAWING OF BRICK ARCHITECTURE.

BY BERTRAM G. GOODHUE.

SINCE my former paper on this subject appeared in these pages, many excellent drawings of brickwork have been printed in the various professional magazines, as well as in *Harper's*, *The Century*, and other lay periodicals, and if you could be induced to thoughtfully study these drawings with an eye to bettering your own work there would be little need of any written words of mine on the subject.

The fact is, I have described, as thoroughly as in me lies, all the different methods that may be employed, with which I am acquainted, except one, and that is the most difficult. An artist of ability who thoroughly understands texture should be and is able to suggest all the many effects of brickwork without so much as showing one brick, either on sunlit space or shadow. I regret my inability at this moment to direct you to any drawing of this description, although the remembrance of many is vivid enough in my mind. Perhaps we architects and draughtsmen, as I said before, are too accustomed to drawing for those clients and committees, whose constant demand is that everything shall be shown and nothing omitted that may be visible on the completed building, to be familiar with the more delicate effects obtained by the artist pure and simple.

However this may be, the fact remains that drawings have been made in which everything in the way of texture has been suggested, rather than shown, and I believe that by taking thought we may even learn the trick, too. It may be objected that this procedure is contrary to those technical principles which demand that a line drawing should be clearly in line, but even here I believe that with perfectly distinct pen-work one may suggest the appearance of brickwork without attempting the reality.

There are now among us three or four men, in each case the product of the last few years, who are struggling to free themselves from the customary limitations of the architectural draughtsman and reaching out after the flying garments of the artist's ideal. It is pleasant to write that success has crowned their efforts to a considerable extent, and that in the course of a few more years the average excellence of architectural draughtsmanship is sure to be raised many degrees. This struggle is taking place both here and in England, and, for aught I know to the contrary, on the continent as well. Indeed, I remember a wash-drawing of Luca Beltrami's of his design for the front of Milan Cathedral, which is altogether a remarkable piece of work, and one which I should like to examine critically here. However, I must not forget that I am writing upon brickwork and nothing else, though it is true I regret that the scope of these articles is not wider, and that I am not permitted to bring up the subject of trees and clouds, since too many draughtsmen seem to consider their labors ended when, having outlined their building, they have laboriously cast their mechanical shadows and cribbed their single human figure into the foreground to show the scale, a personage which the poor client or committee ignorantly accept as of average size, although none of us need to be told that he is only too often scant of stature to the extent of a foot or two. You perhaps have heard of the most glaring case of this kind in recent years, — fortunately for all concerned, discovered in time by the examining committee. The competition was for one of the most important buildings on this continent, and a favored competitor added quite a little mob of figures to his perspective. Using one of these as a unit, and measuring with stepping dividers the height of the tallest portion of his building — and it wasn't a spire, either — it was found to be 800 ft. high! although described as something under 500. Of course this may have been an accidental happening, but cases of the same nature occur too frequently for them all to be accidents.

But to return to brickwork and the men who draw it. Mr. Gregg still remains one of the masters of texture in architectural drawing, and it is with a great deal of satisfaction that I print here his hitherto unpublished drawing of the picturesque old blacksmith shop at Swanton, Vt., a building which I fear was included in the recent fire in that town. Here you may see the effect of sunlight shown in a way which is a triumph of skill and directness; at the same time, Mr. Gregg has found unnecessary the usual expedient, — one to which I am addicted myself, — of drawing only shadows and leaving everything else white. Observe that the lines of his brickwork are almost everywhere brought out, and still a few of the bricks are clearly indicated.

There are other men whose drawings of texture are worthy of study, too, though the number is painfully small, and, on running their names over in my mind, I find myself including illustrators, rather than draughtsmen. Of course, there is no reason why I should not do this, but it is a matter for regret that there should not be more among us. Mr. Du Mond, who has since become one of the great artists of this hemisphere, a few years back drew what probably was to him architectural hack-work for the magazines, as scarcely any one else could have drawn it, and Mr. H. D. Nicholls is now following in his footsteps. Among the architects, Mr. H. B. Pennell, Mr. Campbell, and two or three others have succeeded in bringing to their work far more delicacy and *finesse* than is usual in drawings of the kind. Do you remember the picture of the Villa d'Este from the gardens at the foot of the staircase? In this everything is rendered with the same comprehensive understanding, yet there is no monotony anywhere; the lovely building rises white and shimmering in the distance, while on each side in the foreground looms the black mystery of the cypress shade.

Perhaps the secret of good drawing of any kind lies, not so much in the method learned, or even in the painstaking care with

which it is followed, as it does in the possession of the keen eye which is constantly on the watch for undreamed-of effects of sunlight and atmosphere, and then, the thought which should be put into the guiding of the hand that strives to portray them. One may have studied with the most capable instructors, bent one's mind to grasp their words and theories to the uttermost, and yet, if one falls into a mechanical habit of work after this, — he is lost. This is the great fault of architectural rendering, and the reason, perhaps, why, no

matter how hard I may try, I can describe only a few clearly defined methods of rendering bricks. On reading over my former article, I can find no other distinct manner to add to those mentioned there that could be considered. To be sure, one may put in each brick mechanically, and with a ruling pen, in the fashion usually followed in scale drawings of brick-detail, and it is possible that a drawing so frankly mechanical would be, even from an artistic point of view, better than some of the miserable abortions of rendering which find their way into the magazines from time to time; certainly it would have the inestimable advantage of being easily understood by those for whom it was made. The great object with draughtsmen in this matter is, I take it, to develop in themselves a good, clear, and at the same time artistic method; one which shall be comprehensible to any client, and yet satisfactory to the maker of it, and I wish it lay in my power to say to you, "Take such and such a brand of ink, such and such a pen, such and such a variety of bristol-board, and then draw bricks in such and such a fashion"; you will readily agree that I cannot do this. What I might do would be to tell you that such and such a draughtsman's work was so good that you might with advantage copy it as closely as you are able. If I did this, and you were to believe in and follow such instructions — which heaven forbid you should do — the result would be most dismal. There might be isolated cases where the natural cleverness of one or two among you would revolt after a period spent on such work, but not quickly enough to take from you a certain amount of the handling learned from another, and then there might result a new manner of drawing bricks, but the chances are that it would be dry and hard, and always so reminiscent of the other man's work as to make the source of inspiration apparent to all. No, I do not recommend any such way of learning to draw; there is copying enough in all conscience, as it is. To use the architectural magazines again as an illustration, the drawing in them may readily enough be divided into classes, such as the Wilson Eyre school, the Gregg school, the Pasco school, the Kirby school, and so on. I have even known draughtsmen to pride themselves on the success of these imitations. It is very difficult to avoid falling into mannerisms; shut up within the four walls of an office, and bound to the daily routine of so much work to be accomplished, is it any wonder that one gradually grows to adopt certain well-remembered types for everything? This is not due to individuality; it is due merely to the prisoned life one leads, far from brooks, and trees, and mountains, and, more than that — for a vivid imagination could transcend such limitations — it is due to the absolute necessity for producing so much work in a given amount of time.

It is a recognized truth that nature is constantly changing in her every aspect; no custom can stale her infinite variety, and so, after years of drudgery with pen, and ink, and paper, some fine day you will arise, and, taking your materials under your arm, hie yourself to the woods and fields, to find there elbow room of mind and body and a thousand other marvelous things never before imagined. With but slight skill you will be able to translate these into line and transfer them to paper; and, believe me, three months of such practise will leave its mark on all the work of your after-years. You don't even need to go to the country or abroad; careful consideration of the buildings on both sides of the street as you are walking to and fro from your office will help you vastly.

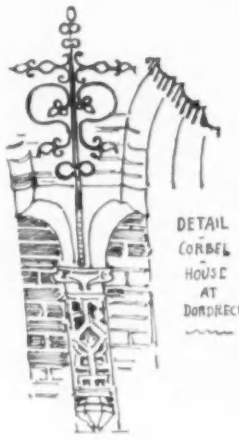
That bricks are tedious things to draw, no one will deny; there are very few who can render them successfully, still these are proof that it can be done, and draughtsmanship is advancing marvellously in quality all the time, — so marvellously that if all illustrative work were not advancing at the same pace we might catch up — the which is Irish, but true. Fifteen years ago current illustration of the average sort was scarcely as good as the best architectural drawing of nowadays, and we may reasonably hope that, apart from figure work, which must always be the stumbling-block to all of us, our work may become as good as the best. There are few enough things to be optimistic about, goodness knows; but this is one of them.

Those of you who were expecting me to teach the gentle art of brick-rendering in one or two easy lessons must be, I fear, grievously disappointed, and yet I can say nothing further than this to aid you in your endeavor. Study the work of the best men, by all means; let your observation of the difficulties met and conquered by them sink into your mind; strive — yes, even strive to please your clients, for that is but wisdom — but strive above all things to please yourselves. To do this thoroughly you will need to bring more thought to your work than one in a hundred does at present; you will need to let your eyes consider many things which at present escape them; and, if so be you are enabled, you would do well to work from nature herself. When you do this forget all about the clients, the light in the office, whether the bricks you are drawing will bond or not, and if you put your whole heart into your pen-point the result will be better than anything you ever did before. True it is, you may not be satisfied; what conscientious artist ever was? But you will be able to take pleasure in the knowledge that you have accomplished what you never thought lay in you or any other man to produce, — artistically drawn bricks!

THE City House Competition drawings are in Rochester, N. Y., this week.

THE BRICK ARCHITECTURE OF HOLLAND.

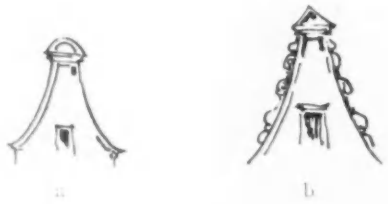
BY R. CLIPSTON STURGIS.



IN the first article I reviewed briefly the remarkable history of the Dutch people and gave some of the general characteristics of their work. In the present article I propose to take up the houses and see how the Dutch used the common material to make them interesting.

I think one is first struck by the unambitious character of the work, and then by the spirit of homelikeness which pervades it all. This is especially true of the smaller towns and villages, but it is also true to some extent of the larger cities. The older streets of Amsterdam depend almost solely for their picturesque effect on the broken skyline formed by the sharp gables, which in themselves are not as pleasant in form as those prevalent elsewhere, being often very narrow and slightly concave (a), the coping sometimes ornamented with rather ungainly scrolls and garlands of fruit (b). In other towns, as in Haarlem, for instance, the gables are largely stepped, with often no attempt at ornament beyond the use of coigns. Such gables as (c) are very simple in detail, and yet present a lively and picturesque effect in perspective, owing largely to the skyline, and to the isolation, and consequent emphasis of the white coigns. The streets also gain much from the accent of the perpendicular lines of the window and door frames, which, painted white and set flush with the outside, are a marked feature in the perspective.

The more modern houses of the Heeren and Keizer's Grachts are plain brick fronts, such as were built in all our Eastern cities



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fifty or a hundred years ago. Older New York, such parts of it as modern improvements have spared, Washington Square and below, is full of just such houses, and they largely composed the streets in Boston which were swept by the great fire.

Within the simple houses of Amsterdam I dare say we should find as much real treasure, as much refinement, as much evidence of advanced culture as is to be found among the pretentious palaces above 42d Street. It is, however, in the smaller and less modernized towns that we find the most interesting examples of brick houses. Delft, Dordrecht, parts of Haarlem and Utrecht, and, further north, Enkhuisen and Hoorn, all furnish us with innumerable examples of good brickwork. Most of them date from the sixteenth and seventeenth centuries.

c

To appreciate what it meant to do good work then, I must just glance again at the condition of Holland. Orange had died in 1584, and, although there had been a comparative lull for awhile before his death, troubles again pressed on Holland when the great leader was gone. One might almost say that all the best architectural work of Holland was done during their years of greatest duress, when they were oppressed on all sides, rent with wars without and schisms within. Church building, of course, came to an end with the general revolt of the country against Roman Catholicism, and this accounts for the large number of unfinished towers and spires, which I shall consider in another article, but secular buildings, both private and public, increased and multiplied, showing in every work the strong spirit of an artistic people.

DORDRECHT. FIG. 1.

In all the houses of the towns mentioned above one cannot but be struck with the thorough mastery that the Dutch have obtained over their material, both in production and in working and laying, the brick are so accurate, and so beautiful in texture, so nicely cut and moulded, and so fairly laid. Nothing better can be done in these materials than we find done here.

Then one is struck by the fact that they never try to do with brick what it is unsuited for,— they never try to conceal joints and make their walls look smooth and unbroken, like a surface of cement, and they never attempt any ornament which is not a legitimate constructive use of brick; but they make the most of every opportunity which the material affords to a skilled workman.

Take the window of the Dordrecht house (Fig. 2), and, by the way, I must apologize for some of my illustrations, which were made often hurriedly, and generally standing in the street; and they are consequently more or less out of perspective; but in essentials they are fairly accurate, and I thought it better to let them go so than to risk losing some of these essentials in an attempt to re-draw more accurately. To return,— this window has an inner reveal formed by a simple cavetto rubbed in the soft brick, and a projecting reveal to the arch. The corbel, which it would have been difficult to do and do beautifully in brick, is made of stone; so are the leaves which terminate the cusps in the tympanum.

In Flemish work we occasionally see the impossible attempted in brick, but in Holland brick is used quite legitimately and simply, or not at all. The fine lines of shaft and corbel would have been almost a *tour de force* in brick, and the cusps would have lost half of their emphasis if executed in the red brick. As in nearly all cases, so here, the rather wide white joint is an important feature, showing the careful laying of the brick, and giving a clearly defined section of the moulded jamb. The keystone and the two stone voussoirs not only brighten up the façade, but

UTRECHT. FIG. 3.

they accentuate the section of the mouldings more than the joints of the brickwork alone would do. The iron ties shown here are a very frequent feature of all these brick façades, and are often quite beautiful in detail.

As I have noted previously, the houses are invariably simple and unpretentious, yet invariably both homelike and interesting. For myself, I find that it is necessary to accustom the eye, as it were, to the irregular gable outlines and to the sharp contrast and almost spotty effect of the brickwork, divided, striped, or coigned with stone. We are not familiar with this sort of thing at home and have to get used to it, just as we have to get used to striped buildings and the free use of many colored marbles in Italy before we can judge of or appreciate their beauty. For illustration I have drawn from sketches made during a somewhat limited visit and in a comparatively small number of places, supplemented by plates from Van Ysendysk's beautiful work on Holland and a few photographs kindly loaned me by Mr. Cuypers, the well-known architect of Amsterdam.

IJERSTEIN. FIG. 4.

Fig. 1 is a house at Dordrecht and is typical of many of the simpler buildings. There is very little attempt at ornamentation — even the stepped gable is omitted — but we have the overhanging stories and the nicely detailed arches over the windows of the third and fourth stories. In this building the general good effect is largely dependent on the nice proportions of the stories, the emphasis given to the chief rooms on the third floor (the second being a mezzanine), and the color of the brickwork.

Fig. 3 is one of the old houses of Utrecht, and a rather unusually good example of the striping of brick and stone, which was probably brought to Holland from Italy. It never seems to me quite at home except in Lombardy, and the few examples in Holland, in England, and here generally look out of place, like a lost animal of strange breed. This house, however, has a really homelike air and a simplicity of façade which is very pleasing. All the effect is concentrated in the striping and the stepped gable with its pinnacles of brick and stone. The canopied niche occupying the space between the second-story windows was gone when I was sketching, to come back again restored. In this case, I trust, not like much English restoration,— the shell without the spirit,— but really restored by a man in touch with the tradition that originally carved it.

HOUSE AT ENKHUISEN. FIG. 5.

Fig. 4 is a shop in Ijerstein, and is an example somewhat unusual of effect gained by offsetting the brick to form a pattern, instead of depending on color alone. Both the pattern under the second-story windows and the coping of gables are made with brick on edge projecting a half inch or so from the ashlar. I think this is a very doubtful expedient for getting effect; it never seems quite constructional, as the projecting upper surface of the brick is exposed to the weather and the joint, also; but this particular instance has stood three hundred years, and that is, perhaps, as much as we could expect. There is the same honesty of purpose here as elsewhere,— the simple shop below, the more lofty second story for storage, and the attic, — simple proportions and straightforward work. The years have done much here to make interesting what, if new, would be a comparatively commonplace piece of work — I mean commonplace for Holland.

Fig. 5— a gable from a house in Enkhuisen, — is chiefly interesting for the pinnacles of the gable, which are set diagonally, and so well laid that they have withstood the weather for a couple of centuries or more. They seem, perhaps, a little unrestful, but make an extremely picturesque skyline.

Fig. 6 is from Van Ysendyck, a house at Kampden, and shows a simple pattern of diaper formed with stretchers and brick on end, a natural use of stone string-courses and good, thorough bond in brickwork. The anchors are particularly nice in detail, terminating in projecting flowers of various designs. The diaper is placed where it is easily seen, tells for its full value, and is terminated at either end by interesting bits of carving. Even the leanto roof shows a touch of the bricklayers' skill in the nice bonding of the coping.

HOUSE AT KAMPEN. FIG. 6.

Fig. 7, from the same source as Fig. 6, is a house at Alkmaar, dated 1609. Here we have very little actual decoration in the brick. There are no moulded brick jambs, no diaper work or pinnacles of brick, but it shows very clearly the accuracy of the

ALKMAAR. FIG. 7.

bond and the good effect of clear, wide joints. This building, being restored, is especially valuable as showing what the style owes to the real merit of its design and workmanship and what is due to the touch of time: and we can at least feel satisfied that the Dutch know and appreciate the good work they have, for they choose to duplicate rather than to destroy, and are capable of restoring well and in the spirit of the first builders.

Fig. 8 is one of Mr. Cuyper's photographs, and shows the Weerhuis at Buren. It is an excellent example of the use of brick in a

THE ORPHANAGE AT BUREN. FIG. 8.

large and dignified building, and also gives a delightful glimpse of the formal landscape gardening for which the Dutch are so famous.

It is, of course, impossible in the limits of a short article and with the space at my command for illustrations to give an adequate idea of how excellent the effect is of the simple brickwork of Holland, so skilfully and so carefully laid; but I shall have accomplished something if I have persuaded any one to try and see what can be done with the simple materials that we have at hand here. To accomplish this, however, it is, first and foremost, necessary that we have brick which will lay up evenly and skilled bricklayers whose idea of bond is not confined to a course of headers to every seven stretchers.

PLATE ILLUSTRATIONS.

PLATE 69. — A window of the Municipia at Monza. This window from the south side of the Municipia or city buildings of Monza is a typical example of Lombard brickwork of the thirteenth century. Voussoirs of sandstone are introduced in the outer arch lines, alternating with broader masses of brick. The columns and sills are also of stone. The jamb and arch molding and the pattern in the tympanum are of brick. The design is instructive as showing what a beautiful effect can be produced by perfectly simple means if the proportions are good.

PLATE 70. — Design awarded first prize in the New York Architectural Terra-Cotta Co. Competition recently held through the columns of THE BRICKBUILDER. The prizes offered amounted to $100 in cash, divided as follows: First prize, $50; second prize, $25; third prize, $15; fourth prize, $10.

PLATE 71. — Balcony on façade of Tremont Temple, Boston. The balcony is the central feature of the façade, and is built of cream-white terra-cotta executed by the Perth Amboy Terra-Cotta Co. It is placed 45 ft. above the street in a flat wall, the face of which is decorated with a quiet diaper pattern of varied coloring, generally of gray tones on a cream-white ground. There is an uninterrupted wall surface of 30 ft. on either side and 20 ft. above this feature. The arched opening is 11 ft. in width.

PLATE 72. — A new store and office building, Winslow & Wetherell, architects, located on the corner of Tremont and Winter Streets, Boston. Built of brick and terra-cotta. Brick furnished by Sayre & Fisher Co.

PLATE 73. — Three designs which won first, second, and third prizes in the William Connors' Competition for an advertisement, held through the columns of THE BRICKBUILDER. The winner of the first prize received $25; second prize, $15; third prize, $10.

PLATE 74. — The First Unitarian Church at Manchester, Mass. A recent example of genuine half-timbered construction adapted to the climate of this country. It consists of an outer frame of seasoned oak and a light interior framework of spruce studding. The outer frame is the true structure, and carries the paneling of the walls and the entire weight of the roof, while the spruce studding gives a nailing for lathing on the inside, and for sheathing of 1¼ in. matched boards covered by building paper on the outer side. The filling of the outer walls below the line of the window sills is brick laid in cement mortar. Above the sill course the panels are plastered with cement mortar, save the borders, which are of brick set flush with the timbers of the oak frame. If the timbers should shrink away from the brick borders the joints could be raked out and pointed afresh without the necessity of renewing the panels.

VIENNA, Austria, is to have an elevated railway, built to run on brick arches. The experience of many years has proved that a brick structure is in every respect the very best for a railway to run upon. There is less vibration and less noise than with a structure of wood or iron. The brick structure is, as a matter of course, a series of arches, and by using a suitable curve for the arch the construction has a graceful and pleasing appearance.

The arches themselves are valuable property, being used for storage, salesrooms, and other purposes. We have seen some fitted up with most expensive tables as billiard saloons, where the players were evidently not incommoded by the passage of trains overhead. It may have been that in this case measures were adopted for deadening the sound, but in another case, where a literary club was established in two or three of these arches, nothing was done to them besides calcimining, and we spent many agreeable hours in the library and reading-room of that club without suffering any annoyance from the trains.— *Brick.*

Fire-proofing Department.

Conducted in the Interest of Building Construction to Prevent Loss by Fire.

EXTENSION OF CITY BUILDING LIMITS.

WHEN, after and as a result of the great Boston fire of 1872, limits were fixed within which frame buildings could no longer be erected, the city of Boston was very different in size and aggregate value from the conditions of the present city, and with its growth has come a need which constantly becomes more pressing for an extension of these so-called building limits.

Where at that time the buildings were separated and comparatively of small size, now large blocks of dwellings, factories, and warehouses extend, without break, from street to street; where formerly buildings were two or three stories in height and contained no great amount of valuable property, they now rise five and six stories and are filled with valuable merchandise or machinery.

This condition of affairs, which then existed only in a limited part of the city, now controls more territory than the whole city contained at that time, and the good of the city demands that the same restriction be applied to the whole of this territory. Within two years we have seen the results which inevitably follow wherever unrestricted construction in the dense part of a city is permitted, and, unless immediate action is taken, the scenes of the Tremont Street fire of May, 1894, will be repeated in other parts of the city. The problem of drawing the new line is by no means an easy one, and can only be properly solved by careful study. This in itself is an additional reason for taking it up at once and giving every point the benefit of mature deliberation.

Such a change is always unpopular, especially with those whose property it affects unfavorably; those, for instance, who must, in consequence of the change, expend much larger sums of money in erecting a building of a given size, or who must abandon some project already in view on account of the restrictions imposed by the building law. Yet it may be well to consider whether at the end of, say, fifty years, any building constructed under the most stringent requirements of the building law will not prove itself a more profitable investment than a less expensive and more inflammable structure. Can there be any doubt that the money expended in the city of Boston for fire protection, if added to the great sums lost there by conflagrations, would have been fully sufficient to put up buildings of the best fire-resisting construction in place of those destroyed? Yet the construction of the light frame building or of buildings with brick *walls* only continues on every side within the city limits where such construction is not rigidly prohibited by law. It would seem wise, therefore, to take the first opportunity for extending as far as possible the protection of the present building law, especially in view of the comparative price of materials of building construction.

The law of 1892 provides that "The city of Boston may from time to time extend the building limits in said city, and may establish other limits in any districts of said city," so that it only remains, therefore, for the city council to fix such new limits as may seem wise to prevent an extension of the compact masses of frame structures which now menace large portions of the city.

It is not the purpose of this article to indicate in any way where the new limits should be drawn, but only to point out some of the probable results of this extension.

Under the present laws governing building construction in the suburban districts, there is little if any encouragement for the investor who desires to put up a building of what is known in the building law as "first-class" construction, *i. e.*, a building in which the amount of combustible material is reduced as low as possible, and, in fact, is confined to upper floors, window frames, doors, and finish work. He is at once confronted with the question of expense as compared with probable income, and, under present conditions, finds that his expensive structure may be closely surrounded by frame buildings of an ordinary class unless he controls a very large amount of territory, and even then must meet this difficulty at all his boundaries. The class of tenants which he is likely to get will be largely determined by the surroundings, and he is likely to find great difficulty in obtaining for the present any adequate return for his money.

Again, the question of fire insurance cost enters not a little into the cost and renting power of his building, and it is not improbable that, in spite of his efforts to have a fire-resisting structure, his surroundings are of such a nature as to justify a rate of insurance which, though lower than the rate on the neighboring property, is still high when compared with a similar building under the conditions which exist within the building limits. Now, were these limits extended, and this argument applies wherever a good, or even reasonably good building law is enforced, the conditions under which new construction must be done are at once greatly modified, and the problem for the investor becomes very different. The new building cannot be entirely or even largely of wood; its height and its area are restricted within somewhat narrow limits unless the building is of "first-class" construction; its stairways, light shafts, elevator ways, in fact, every flue by which fire might be carried from one part of the building to another must be built of fire-resisting material. The construction of the floors must be such, especially in buildings for mercantile or manufacturing use, as to make the use of iron beams almost a necessity, while all "weight-bearing metal" must be covered with material which will resist for a time, at least, the action of a large mass of flame.

On the other hand, if he builds a structure which is of the kind known under the Boston law as "first class," that is, what is usually known as "fire-proof," the height and area of his building can be much greater, and if land values are at all large he will find that the added floor space on a lot of given dimensions will go a long way toward paying for the difference in cost of construction.

His neighbors can no longer build "tinder boxes" under his very eaves, and his insurance rate drops to a figure which seems almost nominal in comparison with the rates upon buildings of the older types. His tenants, too, no longer come of necessity from the cheaper class; they, as well as he, will realize the added security and the improvement in appearance of their surroundings, and this will react on and be felt in the renting power. Freed from the incubus of cheap and ordinary buildings, these parts of the city will improve in character, and values will increase in such a way as to encourage the investor to new construction.

Nothing can be surer than that in the end the best construction is that which is most lasting, and one element of permanency, if not the most important, is power to hold fire in check. With the encouragement that the building law now gives within the "limits" to "first-class" construction, we have already seen more work of this class done within the past two years than in any ten years previously, and a permanent improvement has been effected in this district. The time has come to extend the encouragement to other parts of the city, with good reason to believe that like results will follow within the newly protected territory. Let us hope that before a new season opens we shall see this accomplished, with a firm belief that as a result will come fine structures of brick, terra-cotta, and well-protected iron to replace the flimsy frame buildings which now deface and menace so much of our suburban territory.

THE "COLUMBIAN" SYSTEM.

A SYSTEM of fire-proof floor construction known as the "Columbian" system, patented and controlled by the Columbian Fire-proofing Company, of Pittsburg, Pa., has recently sprung into prominence, and seems to be meeting with great favor.

The system consists of rolled steel bars with double ribs, which are suspended from and attached to beams by means of steel

stirrups, which have the profile of the bar cut in them and are hung across the beam — the bars and stirrups being surrounded by and embedded in Portland cement concrete.

Two forms of construction are used: The "paneled," in which the floor alone is constructed, the lower portion of the beam projecting below the ceiling line being encased in concrete slabs, which are molded with iron ties embedded in such a manner that there are no exposed clamps.

The second form, termed "flat ceiling construction," is constructed by using a light bar resting on lower flange of the beam, on which ceiling is cast, and floor formed as in "paneled" construction, an air space being left between the floor and ceiling.

The claims made for this floor are: —

First.— That the combination of the special shaped bar and concrete produces a floor of enormous strength and great rigidity.

Second.— That it cannot be broken down suddenly, but in case of severe overloading deflects, so that it is absolutely safe in this respect, and any overload could be detected without any danger of complete failure.

Third.— That it is able to withstand drop or jarring loads to a marvelous extent.

Fourth.— That a heavily loaded floor will withstand the effects of fire and water without any damage.

Fifth.— That it is in most cases the most economical fire-proof floor in use.

The first public tests of this construction were made in the L. H. Smith warehouse, Pittsburg, in December, 1894, in the presence of a number of architects, engineers, and public officials.

The distance between center of beams was 8 ft., on which a Columbian floor 3¼ ins. thick was constructed. A superimposed load of 810 lbs. per square foot was placed clear of beams, which remained standing for several days without any deflection resulting. A drop test of 238 lbs. from a height of 8 ft. was also made, the load dropping midway between beams without cracking the floor or injuring it in any way. This drop was repeated several times.

Tests of similar character were subsequently made in various places and in the presence of different people, the loads in all cases being four or five times the required floor load, without deflection. The floors tested were selected at random from work completed. Such tests were made in New York, Pittsburg, Polk, Cleveland, etc.

A very interesting fire test was made by this company in May last under the direction of the Board of Underwriters and Fire Department of Pittsburg. The test was made under the following specifications: —

BUILDINGS OF LAKESIDE HOSPITAL, CLEVELAND, OHIO.
Showing mixing and hoisting apparatus in use by Columbian Fire-proofing Company.

BOARD OF
FIRE UNDERWRITERS
Of Allegheny County.
Office, 83 Fourth Avenue.

PITTSBURGH, PA.,
March 4, 1895.

COLUMBIAN FIRE-PROOFING COMPANY.

Gentlemen:—The following specifications of a fire test on fire-proof floor construction will be required on all non-combustible floor construction before the same will be passed by this board.

Enclose a space of 8 ft. square with a brick wall, having a protected steel beam in the center of same, thus having two half spans of floor arch enclosed; said beam must not rest on enclosure wall, but must be a 12 in., 32 lb. beam with a span of 16 ft. between supports.

Enclosure must be so arranged as to have a flue outlet and a door opening at the other side by which to feed fuel to fire bed.

Place furnace bed 4 ft. below bottom of arch, and maintain a mixed coke and wood fire at as high a degree of temperature as is possible for at least one hour; then beam and arch must be drenched by a plug stream of water, hose to be 2½ ins., with a 1 in. nozzle, under a pressure of 65 lbs.

While fire is in operation the span of the floor must have a load of 750 lbs. to the square foot resting on same.

The test must be witnessed, and in charge of an officer of this board.

Yours very truly,
F. C. BIGGERT,
Ass't Secy.

An examination of the floor after the test was concluded showed that it was not injured in any way whatever, and on the strength of this result a special rate of insurance for warehouse building was granted on this construction by the Allegheny County Board of Underwriters.

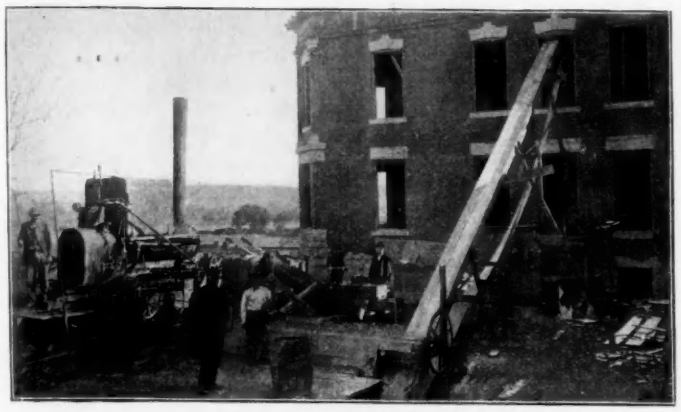
This company makes a specialty of large work, and the manne of construction is interesting.

The concrete is measured, mixed, and hoisted automatically. By means of a measuring device, the sand, slag or screenings, and Portland cement are measured and dumped into a hopper which feeds into the mixing machine. The concrete is carried through this and emptied into a boot, through which a bucket machine operates, carrying the concrete to any floor. It simply remains to wheel the concrete and tamp it in place on the floors. The work is thus carried on with great speed, while the other work is in progress.

Great attention has been paid by this company to the proper insulation of columns and girders. Columns are fire-proofed by means of a homogeneous cast of concrete, which not only thoroughly insulates them, but also greatly strengthens the column.

Girders and beams are fire-proofed by means of concrete slabs, so molded as to leave an air space around the girder, to which they are attached by means of clamps cast in the concrete in such a manner that they are entirely protected from the attack of fire.

Concrete formed of Portland cement and the proper aggregates is one of the most fire-resisting materials in use, and with this



CONVEYING, MIXING, AND HOISTING APPARATUS,
In use at Pennsylvania State Institute for the Feeble Minded, Polk, Pa.
Columbian Fire-proofing Company.

feature, together with the immense strength and general excellence of all the details, the growing favor with which this construction is received is not to be wondered at.

Amongst the work which this company has executed during the past season may be mentioned: Pennsylvania State Institute for Feeble Minded, Polk, Pa., twenty-three buildings; Lakeside Hospital, Cleveland, Ohio, eleven buildings; Simpson Departmental Store, Toronto, Ont.; Department Public Safety Building, Pittsburgh, Pa.; Cuss Realty Building, New York, N. Y.; four warehouses, three stables, two schools, two telephone buildings, brewery, office buildings, etc.

ROD POWELL.

THE Committee on Fire-proofing Tests held a joint meeting with the Advisory Board of said committee on the 14th inst. There were present: Messrs. Reed, Parsons, Rowland, and Heins, of the committee, and the following of the Advisory Board: Professor Henry Morton, president; Professor Huntington; Chas. A. Hexamer, secretary Philadelphia Fire Underwriters' Association; Edward Atkinson, president of the Boston Manufacturers' Mutual Fire Insurance Company; F. H. Kindel, structural engineer of Carnegie Steel Company; F. C. Moore, and H. B. Dwight.

Plans of the proposed testing furnaces were exhibited and a general discussion of the subject of the proposed test followed. The committee reported that sufficient funds had been subscribed to warrant an immediate beginning of construction of the testing plant. The committees then made a visit to the Manhattan Bank Building recently injured by fire.

Mortars and Concrete Department.

Devoted to Advanced Methods of using Cements and Limes in Building Construction.

AMERICAN CEMENT.

BY URIAH CUMMINGS.

CHAPTER VI. (*Continued.*)

THE CHEMISTRY OF CEMENTS.

GEN. Q. A. GILLMORE in his "Treatise on Limes, Hydraulic Cements, and Mortars," ed. 1879, page 304, says: "Magnesia plays an important part in the setting of mortars derived from the argillo-magnesian limestones, such as those which furnish the Rosendale cements. The magnesia, like the lime, appears in the form of the carbonate ($MgO.\ CO_2$). During calcination the carbonic acid (CO_2) is driven off, leaving protoxide of magnesia ($MgO.$) which comports itself like lime in the presence of silica and alumina, by forming silicate of magnesia ($SiO_3, 3MgO$) and aluminate of magnesia ($Al_2O_3, 3MgO$). These compounds become hydrated in the presence of water, and are pronounced by both Vicat and Chatoney to furnish gangs which resist the dissolving action of sea water better than the silicate and aluminate of lime. This statement is doubtless correct, for we know that all of those compounds, whether in air or water, absorb carbonic acid and pass to the condition of subcarbonates, and that the carbonate of lime is more soluble in water holding carbonic acid and certain organic acids of the soil in solution than carbonate of magnesia.

"At all events, whatever may be the cause of the superiority, it is pretty well established by experience that the cements derived from the argillo-magnesian limestones furnish a durable cement for constructions in the sea."

G. R. Burnell, C. E., of London, in his work on "Limes, Cements, and Mortars," 1868, page 17, makes the following remarkable statement:—

"In the actual state of our chemical knowledge, it is impossible to say whether there exist any definite proportions either of silica alone, of silica and alumina, or of silica and magnesia, etc., which are capable, when mixed with the same quantity of pure lime, of producing hydraulic limes of similar qualities. Indeed, the whole of this branch of chemistry, notwithstanding the important discoveries made in it of late years, is still very little understood.

"The action of the oxide of iron, for instance, quite escapes the attempts made to include it within any law. The action of the magnesia seems also involved in the same obscurity."

This being the true "state of the art" as late in the history of cements as 1868, it is not difficult to understand and appreciate the conflicting opinions of the leading authorities rendered prior to the date named, as well as those expressed subsequently, and it may truthfully be said that even at the present time the art of cement fabrication is but little understood. In fact, but a slight and scarcely visible abrasion has been made on the surface of the subject, and, considering the limited number of scientists who take any special interest in the subject, it may safely be predicted that any advance in the art is destined to be of slow growth; and that many years will have elapsed before it can truthfully be claimed that the chemistry of cements is at last freed from the fetters of tradition and rests securely on a solid and permanent foundation.

And when it is considered how vastly important the subject is, in view of the fact that over 30,000,000 barrels of cement enter yearly into the works of construction in Europe and America, it is to be regretted that our universities and institutes of technology, do

not embrace in their curriculums a systematic study of the chemistry of cements.

So largely does this material enter into the construction of all engineering and architectural works and so rapidly does the field for its use widen that it is becoming a necessity that this subject should receive the attention its importance merits.

As already stated, the discussion concerning the effects of the presence of magnesia in a cement has extended over a long period of years, and, unfortunately, many conclusions have been drawn which are purely hypothetical, and, lacking in practical proof, are not only useless, but, by being misleading, become harmful. An error of this character is afforded in the passage quoted from Gillmore.

Silicates are not decomposed in the manner stated. The only portion of a cement that could be thus acted upon by carbonic acid is the lime and magnesia that may be in excess of true combining proportions with the silica present.

Practical experience has demonstrated that any cement which contains an excess of either lime or magnesia, if not thoroughly hydrated prior to its application, is attended with the danger of expansion. And any cement deficient in these bases is subject to shrinkage. An excess of lime in a cement, whether natural or artificial, without thorough hydration, as already stated, will surely expand to a greater or less extent. And, as the process of hydration as usually practised consists in the mere spreading of the manufactured cement on a floor and by repeated turnings with shovels, exposing the body of the cement to the atmosphere, the caustic lime takes up the moisture in the air, and produces a hydrate of lime which is thereby rendered non-expansive. And its influence on the resultant mortar is the same as when a given percentage of thoroughly slaked quicklime is added to a harsh or quick setting cement, rendering it less active and imparting a pasty consistency to the mortar. An excess of lime in a cement, whether inherent in the cement or added subsequently, if the hydration has been conducted thoroughly and conscientiously, cannot be considered as harmful; on the contrary, it may be, on the whole, beneficial. The only danger attending its use arises from the extreme liability of an imperfect hydration.

The often expressed opinion that any excess of lime or magnesia will ultimately dissolve out of the masonry, leaving the mortar porous, and thereby lead to disintegration, is not borne out by the facts. Teil hydraulic lime, containing thirty-four to forty per cent. of free lime, has been used in enormous quantities for centuries, and certainly in sea water since 1832, and the free lime which it contains shows no signs of dissolving out, whether used in air or water.

In the manufacture of artificial cements, which invariably contain an excess of lime, the question of thorough hydration presents in the case of large and extensive works quite a serious problem, one which enters quite seriously into the cost of manufacture.

The large floor space necessary for the purpose and the time required for thorough hydration, the large stock to be carried and the labor involved in turning, enter into the cost of production, and, as in these days of close and severe competition the strictest economy in manufacture becomes imperative, it is evident that the process of hydration is oftentimes hurried and imperfectly done.

The author has never, in a long series of trials, been able to find an artificial cement of foreign or domestic production which, when made into grout and poured into bottles, would not sooner or later fracture every bottle.

The only significance to be attached to these trials consists in the fact that none of the brands tried contained magnesia in excess of the empiric limit of three per cent.

The expansion, therefore, could not be charged to that source, and the only conclusion to be drawn was that the process of hydration had been improperly conducted, and caustic lime had been permitted to remain in the cement when packed for the market.

Neither lime nor magnesia will expand in a cement if combined with silicic acid or when in a free and uncombined condition, if thoroughly hydrated.

There are no known cements which would be damaged in quality should they contain magnesia up to the combining limit.

We have shown that magnesia combines with silica in certain fixed proportions, and that when lime enters into the composition the proportions as between silica and magnesia are changed, but in either case the proportions are fixed and constant. A true silicate of magnesia will attain a hardness equal, if not superior, to that of silicate of lime.

The former contains a larger percentage of silica, as will be seen from the following table.

Silicate of Magnesia.		Silicate of Lime.	
Silica,	42.92	Silica,	34.91
Magnesia,	57.08	Lime,	65.09
Totals	100.00		100.00

If there is any advantage in the inherent hardness of the constituent parts considered separately, the advantage would seem to be in favor of the silicate of magnesia, as silica is harder than either of the bases named, and, while it requires but 760 parts of water to dissolve one part of lime, magnesia is practically insoluble in water.

An illustration is afforded in the large number of shell-marl beds found in many portions of this country (nearly all of which are formed by animal secretion in the waters of former lakes or ponds). Although the surrounding or adjacent rocks are in most instances magnesian limestones, from which by infiltration the ponds became supplied with calcium carbonate in solution, and from which the shells were secreted, it is very rarely that the shells are found to contain even three per cent. of magnesium carbonate — being practically pure calcium carbonate.

Several years ago, the author, in searching for a reason for this general belief in the dangerous qualities of magnesia in a cement when exceeding the time-honored limit of three per cent., instituted a series of experiments.

Magnesian limestones were secured which varied in their proportions of carbonate of magnesia from five to fifteen per cent. These were marked and treated separately, by grinding the samples to impalpable powder, to which was added clay in an equally fine condition, in such proportions as are prescribed as the correct formulæ for Portland cements, and, after a thorough admixture of these ingredients, the samples were moistened and formed into balls and cakes, which were then calcined with coke to the point of incipient vitrifaction, after which the samples were finely pulverized, the powder thoroughly hydrated, formed into patties, balls, and briquettes, and given the usual time in air and water.

The tests extended from one day to one year. The weight and tests were fully up to the standard for the best artificial cements. Some of the samples are now nine years old; they have been kept in both fresh and salt water, and they show no signs of expansion or checking, and they are exceedingly hard.

Following in this line to determine if it were possible that a good cement could be produced, should the lime be replaced entirely by magnesia, many experiments were conducted with various substances known as silicates of magnesia, with varying success, until a trial of serpentine ($Mg_3 Si_2 O_7 + {}_2H_2 O$) was reached.

In the experiments with this material much difficulty was experienced, owing to the varying qualities of this rock. It was found that verd-antique, a mixture of serpentine and calcium carbonate, and many samples mottled or otherwise not uniform in color or texture gave results that were not entirely satisfactory. But the dark green varieties which were uniform in color and fine in texture gave results that were most surprising.

Samples of this class from near Philadelphia, Penn., near New Haven, Conn., and Marquette, Mich., yielded an hydraulic cement that equaled in hardness and toughness the best natural or artificial cements.

(*To be continued.*)

EDITOR OF THE BRICKBUILDER:

Dear Sir, — I believe your columns are always open to friendly discussion, and I hope you will afford me a little space to discuss the report of the Master Builders' Exchange of Philadelphia on standard specifications for cement published in your October number.

The report mentions that its clauses are based largely on those of the American Society of Civil Engineers formulated ten years ago. Since that time rapid advance has been made in cement making, and the American Society of Civil Engineers feel that their specifications are a little out of date, and are, I believe, considering the idea of remodeling them. The gentlemen forming the committee reporting on the matter should have investigated the matter more fully or taken expert advice before committing themselves to such a lax set of specifications as they have placed on record for public approval and their own use. To take up the matter, clause by clause: —

1. *Specific gravity.* During the last three years I have tested very carefully about forty brands of Danish, German, Belgian, English, and Canadian Portland cements, and not one of them has gone as low as 3.00 in specific gravity; therefore, I consider a clause demanding a value of 3.00 for specific gravity is of *no value* whatever to prevent under-burnt products. Natural cements, also, usually range from 2.90 to 3.05; therefore, there is little use in specifying a minimum of 2.50 for natural cements. A specific gravity of about 3.09 for Portlands and 2.90 for naturals would really obtain what was intended, — namely, well-burnt products.

2. *Fineness.* Why should there be two classes of tests? Surely, any two persons can sift cement the same, whether in a laboratory or in a contractor's shanty. What should be specified is that a certain amount of cement should be used in sifting, and that the sifting should be continued such a number of minutes; then uniformity will be obtained. For myself, if I use 10 ozs. of cement, and sift two and one half minutes on a No. 120 sieve, then sift the residue one minute on a No. 100 sieve, then the residue three fourths of a minute on a No. 80 sieve, then the residue one half minute on a No. 50 sieve, I find the residues are about uniform in size and color. I obtain close uniformity. If only a No. 100 and No. 50 sieve are used, the same method could be employed.

Regarding the actual amount of residue demanded, that is entirely a matter of dollars. Fine grinding must be paid for, but the clause, as set forth in the specifications being dealt with, is so lax as to call forth a protest.

Any natural cement having more than 15 per cent. residue on a No. 100 sieve should be certainly rejected, because they are so lightly burnt as to make it very easy to grind them finely. It is quite easy to obtain Portlands and naturals with only 10 per cent. residue on a No. 100 sieve, and this is the requirement of the standards of Canadian Society of Civil Engineers, formulated in 1894.

3. *Checking or cracking.* No checking when exposed in air or water! How long are we supposed to wait? The report does not say, but from a great number of experiments I have made I would say that cements with a slight amount of free lime in them will stay solid in *cold* water for several months, but finally crack. The only way to develop "blowing" in a short time is to subject the cement pats to hot air or hot water.

4. *Strength.* With ordinary care, neat cement briquettes made in the ordinary way, by using sufficient water to make a plastic mortar, then putting the mortar into the molds with a trowel, and shaking the molds well to drive out air bubbles, will give fairly uniform results; but in making *sand tests* the method of putting the mortar into the mold is the whole matter; a one week test, three to one, can be made to vary all the way from 25 to 150 or even 225 lbs., depending entirely on the manner of placing the mortar in the molds. Therefore, a clause not stating how this is done is of no value whatever, even if the clause stated that the mortar should be *rammed* into the molds. There are as many ways of *ramming* as there are operators, and the results might vary by at least 100 per cent.

Personally, I consider sand tests are of little value, because if the clauses of specific gravity, fineness, blowing (or checking), and neat tensile strength have been satisfied, then one can predict the comparative sand test value; but if sand tests are wanted, then I believe firmly that there is only one way to make them strictly comparable, and that is to put the mortar into the molds in a soft, plastic condition, such as is used by masons, and let it be forced into the mold under a uniform dead pressure. This method I have used for over a year, and I feel I can determine accurately the desired knowledge of the actual cementing strength of sand mixtures as used in practise.

Should any of the readers of your paper desire fuller details and results of this method, it would afford me pleasure to publish them in your paper.

Yours respectfully,

CECIL B. SMITH.

McGill College, Montreal.

CEMENT FOR ROOFING.

WASHINGTON, D. C., Nov. 7, 1895.

IN a report to the Department of State, under date of Oct. 19, 1895, J. C. Monaghan, United States Consul at Chemmitz, Germany, gives some particulars of a new roofing material, recently invented by a man named Kohlers, living in Limbach, Saxony.

This material consists of cement and gravel, is as durable as slate and much cheaper, looks as well, if not better, and can be made much easier and put on quicker than slate. In a country like the United States, says the consul, where wooden shingles are almost universally used, and by reason of which fact the danger from fire is greatly increased, this new roof will soon win its way into favor.

This roofing material is composed of one part cement and three parts sand. These are mixed into a mortar-like consistency through the addition of clean water, after which the mass is pressed into a mold. The work of mixing and pressing is so simple that it can easily be done by boys.

Its most practical value as a substitute for wooden shingles is that the cement roof is proof against fire. It fills, too, every requirement of a good roof, being durable, proof against all kinds of weather, and is light. It may be made as light or as heavy almost as any one would wish and it can be given all the colors of natural slate, besides fifty more shades possible.

A square meter of this material will weigh thirty-eight kilograms, or, say, one square yard represents a weight of seventy-six pounds, though, as mentioned above, its weight can be varied at will.

Two houses in Germany have turned out from ten to twenty million such "plates" as above described in the last few years, simply because they were found to be superior to all other styles of roofing, but this roof prepared by Kohlers is the best yet produced. This distinction is owing to the fact that a ridging or grooving is run on the inside of the plate, and permits of one so lying on and into the grooves of another as to preclude the possibility of wind or water making their way inside.

Nothing whatever is welded for the Kohlers roof except these plates, as nails, paints, and plaster play no part in its manufacture or installation. Plates may be made of pressed glass in exactly the same form, and fitted to roofs, thus avoiding the cost of building in windows.

The cost of production is nominal. Both material and machines necessary to make this roofing are very cheap. A machine with three hundred full size and one hundred half size molds costs less than five hundred dollars. Of course the cost per square yard of the tiling will then depend upon the prices paid for sand and cement.

Machines and material may be transported to the place of building, and the plates can be made on the ground, thus avoiding breakage, although well-made plates are as hard as bricks and not more liable to loss from breakage.

It has been patented in almost, if not in every, civilized country. In conclusion, Consul Monaghan says: "I write about this particular cement roof, because I believe it is bound to revolutionize roofing all over the world, and because it came forcibly under my own personal observation right here in Chemmitz."

HYDRAULIC MORTAR.

A GERMAN contemporary has an interesting article in a recent issue on the influence of soft water and of sea water upon the hardening of hydraulic mortar. As so many of our readers are not only clay-workers, but users of clay-workers' productions, we think a note on this subject may be of service.

Experiments were carried out by Herr N. M. Koning and Herr L. Bienfait with various mixtures of Portland cement and sand, to which in some cases a proportion of hydraulic lime was added. These mixtures were then molded into bricks with sea water or soft water, and immersed for periods ranging from one to six months in sea water and soft water respectively. At intervals the bricks were subjected to the usual mechanical tests.

The article in which their experiments are described discusses in detail every step taken during the investigation. It will be sufficient for our purpose, however, to notice the results arrived at.

In the case of the mortar which was made by mixing with soft water, and which was subsequently submerged in soft water, it was found that the rate and degree of hardening, especially during the early part of the time, was increased when hydraulic lime entered into the composition. This effect was weakened by increasing the amount of sand in the mixture.

The mortar which was made with and afterwards immersed in sea water did not harden so well nor so quickly if hydraulic lime entered in any proportion into their composition. All these mortars gave inferior results to those in which soft water was used.—*British Clay-Worker.*

THE EFFECT OF FREEZING ON CEMENT MORTARS.

IN an article recently published in *Engineering News* Messrs. P. L. Barker and H. A. Symonds give the results of a large number of experiments they have carried out on the effect of freezing on cement mortars. Most of the specimens were tested transversely, but control experiments in tension were also made. In order to reproduce the conditions of actual work as closely as possible, the various specimens were caused to set under a pressure corresponding to the average weight of a course of masonry 18 ins. deep. These specimens measured 5 ins. in length by 1 in. square in cross-section. They were tested on a 4 in. span with a central load, and after breaking, the long fragment was again broken on a 2½ in. span. Six brands of cement were used, and were mixed with screened sand in various ratios, and then allowed to set at low temperatures. Both salt and fresh water were used in gauging the specimens. The conclusion arrived at, based on over six thousand results, is that Portland cement mortar suffers no surface disintegration under any condition of freezing, but that in most cases its strength is reduced, in some cases by as much as forty per cent. Rosendale cement is disintegrated when exposed to frost when setting, and its cohesion may be entirely destroyed by immersion in water which becomes frozen round it. Salt water prevents this disintegration to a large extent, but seems to have an injurious effect on the strength. The cement below the disintegrated surface is stated to be increased in strength when the Rosendale cement is used. A mixture of a natural-rock cement and of Portland cement gave very satisfactory results, as its surface did not disintegrate, and its strength was increased by the freezing. Portland cement is injured less proportionately as the percentage of cement in the specimens is reduced. Lime mortar is ruined by alternate thawing and freezing, but fairly good results can be obtained in the case of brick masonry when the mortar is kept frozen for some time after laying.

The Masons' Department.

Conducted in the Interests of the Mason and the Contractor for Brickwork.

A NOVEL BRICK CHIMNEY.

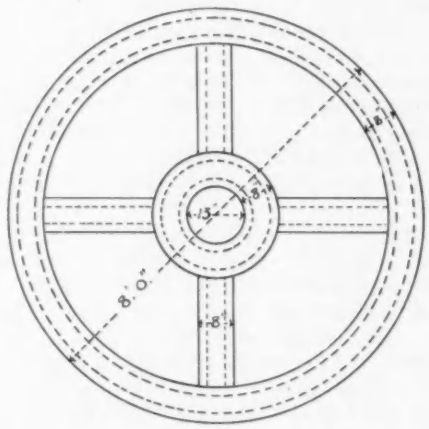
MR. D. J. CURTIS, of Springfield, Mass., had built for him about a year ago, at his brickyard in Chicopee, Mass., a brick chimney, which is really a novelty in its construction and, what is more, has proved a complete success. The following brief description of this chimney will undoubtedly be of interest to those who desire a better draft for their furnaces, but cannot afford a high-priced stack.

Mr. Curtis' plant is situated in the midst of a rich clay bank and in a spot convenient to his boiler. He made one excavation 8 ft. deep and 8 ft. square.

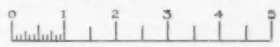
On the bottom of this pit he placed a layer of 2 in. oak plank, and on top of these he laid another layer of the same material, crosswise.

For the inside flue he turned a circular wall of brick 13 ins. in diameter on the inside and 8 ins. thick. Outside of this he turned another and larger circle 8 ft. in diameter on the outside and 8 ins. thick. These two walls he connected by four arms or braces, as seen in the illustration, which were also 8 ins. thick, and were bonded into the circular walls every three or four courses.

These walls were run up plumb to the top of the ground, or about 7 ft., where he changed his 8 in. walls for 4 in., starting them



PLAN OF CHIMNEY AT GROUND
DOTTED LINES SHOW 4 IN WALLS



SCALE OF FEET

exactly in the center of the 8 in. walls. Incredible as it may seem, he ran these 4 in. walls up 72 ft., where the batter of the outside caused the two walls to come together.

On top of this a cap or head was put on 8 ft. high, which made the total height of the stack 80 ft. above the level of the ground. The chimney above the level of the ground was built of circular brick, which were easier to lay and made a better job.

In the construction of this stack Mr. Curtis used only the best and hardest brick, and, above all, he took particular pains to see that the bricks were well wet before being placed in the wall. From the bottom of the chimney to the head he used only the best cement mortar, and for this purpose he consumed 35 bbls. of Rosendale

cement. The head was laid up with Portland cement mortar, which required 6 bbls. of Portland cement.

The number of brick used in the chimney was a little less than 25,000, and the mason laid these for about $4 per thousand. Counting the brick at $125, labor, $100, cement, $60, sand, planking, and cost of excavating, $30, we have the total cost of an 80 ft. brick stack, $315.

It is the accepted theory, we believe, that the core or inside lining of a chimney should be left entirely free from the outside, as the intense heat brings about an expansion and contraction of the walls, which is apt to make serious cracks in them. But Mr. Curtis' experiment seems to have upset all these theories, as this stack has been used with intense heat for about a year, and it stands to-day as solid and firm as the day it was built. Mr. Curtis will be glad to exhibit his chimney to any one interested, and will try to convince all comers that his idea is practical and economical as well. It is certainly a radical deviation from the usual method.

HOW TO BUILD A CHIMNEY.

SIMPLE as it may seem to build a brick chimney and top it out, it is seldom done in a first-class and workman-like manner. In the first place, especially in wooden houses, the best and hardest brick are selected for the outside walls, or the underpinning in frame houses, and the soft brick and bats are put into the chimneys. Any one with a practical knowledge of the requirements of chimney flues will at once recognize the folly of this method. To be sure, they generally use good brick for the top, but it is up through the inside where there is danger of the fire eating through the soft brick and heating the timbers so that sometimes they become completely charred, and many disastrous fires have been traced directly to this cause.

The use of tile flue lining, which we are glad to note is rapidly coming into general use, overcomes this evil to a certain degree. Many round tile are now placed in square flues, the tile being used for smoke and the four corners of the flue for ventilation.

In topping out a chimney there is a wide difference of opinion as regards the best materials to use as mortar. It has often been remarked that houses built in "ye olden times" had chimneys laid up with simple lime mortar, and when it becomes necessary to tear them down, to make room for more modern structures, they have been found in a good state of preservation; in fact, it is often a hard matter to separate the bricks from the mortar. With a knowledge of this fact, many authorities claim that the masons of to-day do not use as good mortar as the masons of long ago. Their opinion is certainly open to severe criticism. In the first place, they used wood as fuel almost entirely, whereas the common fuel to-day is anthracite coal. As almost every one knows, the gases generated by the consumption of the fuel employed are the prime destructors of chimneys, decomposing and destroying the life of the mortar employed, and causing the softer bricks to chip and flake. Now, the gases thrown off from a wood fire are not strong enough to make any perceptible effect on a well-constructed chimney; but when coal is the fuel we find a far different state of affairs, and just here we find the reason why the chimney built a hundred years ago did not fall to pieces in a few years, like those of the present day. Having found that the gases, or condensation of gases, are the chief factors in the destruction of the chimney, we must employ those materials least susceptible to their ravages, and the experience of some of the most practical mason builders in the country has suggested the following rule: Use only the best and hardest brick throughout the entire chimney, laying them in best lime mortar to roof, and be particular to fill all joints FULL. Above the roof use mortar composed of one part lime and four parts cement, with sand enough to work smooth. The plainer the chimney top is in design the better. Saw-tooth work and similar ornamentation should be avoided, and the largest chimneys should not be drawn out at the head more than eight inches in each direction. Keep the inside of the flue straight and smooth. Change the bond in setting out the projections in the head to avoid the use of small pieces, or "Dutchmen." Do not make the top course smaller than the shaft of the chimney. On top of the brickwork put a stone coping and fasten the dowels with melted lead, and on top of this coping put a flat, smooth stone, supported at each corner by small blocks of stone, whose height must depend on the size of the flue or flues.

A strict observance of these rules will give as a result a well-built, safe, and durable chimney, which will not be affected by the weather or gases nearly as soon as those built in the ordinary manner.

BUILDING A LARGE DAM.

ONE of the largest, if not the largest, dam in the New England States is now in the course of construction at Holyoke, Mass., and is to hold in check, for the use of innumerable mills and factories, the mighty waters of the Connecticut River. To build such a dam is no small undertaking and requires a large amount of time and money. It is going to take about three years to complete this work, and, though the contract price has never been made public, it is understood it will cost considerably over half a million dollars.

No new gate-house will be needed. The dam in high freshets must sustain a pressure of about 37,500 lbs. to the lineal foot, acting with leverage of 13⅓ ft. Under such circumstances the structure will have a factor of safety of four. The cement mortar is composed of one part cement to two parts of clean sharp sand. The concrete has two parts of broken trap rock to one part of the cement in the mortar.

There will be used 50,000 bbls. of Alpha Portland cement, 34,500 yds. of rubble masonry, and about 14,000 yds. of granite.

Much work has been accomplished during the past season, and in some places the huge mass of masonry is just beginning to rise above the level of the river-bed, which gives a general idea of the undertaking.

This is the third dam to be built across the river at this point. The first was finished in November, 1848, but when the gates were shut and the water was allowed to accumulate the dam was unable to stand the pressure and rolled over and went down stream. It cost about $40,000, and was a total loss. The next one, which is now standing just above where the new one is being erected, was finished in 1849, and cost then $150,000. In 1870 the present big apron of the dam was put on, that is, the long slope that extends down the river from the dam. This cost much more than the dam itself, or $250,000.

From time to time repairs have been needed on the old dam, and have been made, but the need of a new dam has been foreseen for some years, and preparations have been going on for some time toward that end.

The Water Power Company made the necessary excavations for the work, and then called for bids for constructing the dam. There was considerable competition, but the Fruin-Bambrick Construction Company, of St. Louis, succeeded in getting the contract.

Standing on the Holyoke side, near the gate-house, the whole work can be seen at once. The new dam is about 130 ft. below the old wooden one, and what little water flows over or leaks through the old dam is run off through a long narrow channel, cut and blasted out in the bed of the river. The collecting of the water in this channel has left the rocky bed of the river dry and bare, and a rough-looking scene it is.

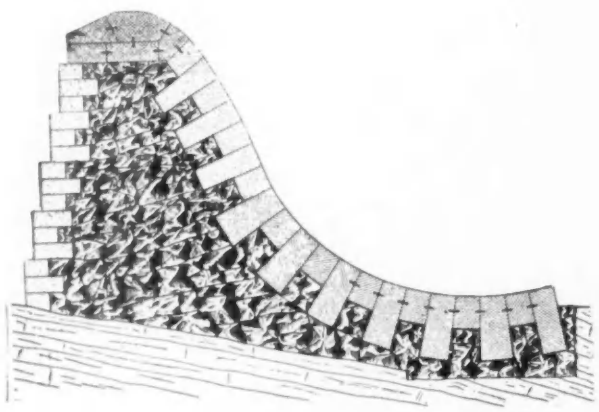
Probably the first thing one notices is the cable road over the river, ending in the big wooden skeleton towers at either end. There are five cables running from tower to tower, considerably over 1,000 ft. The great center cable weighs 12 tons, the other four, two on each side of the large one, being somewhat smaller. The towers are built to stand a strain of 200,000 lbs. On these cables are carried out men, cars of cement, great blocks of stone, — anything, in fact, that is needed. When the carrier is on the Holyoke side of the river there can be seen a number of loops of chain, hanging down from the

cable behind it, which grow less in number, one by one, as the carrier goes across the river. These chains are fastened to traveling pulleys which support the haul cable, which, of course, has to lengthen and shorten as the car goes out and back.

When the car starts out the pulleys all go with it, but when it has gone a little way the pulley nearest the starting point is stopped by the straightening of the loop of chain which connects it with the tower; and a little farther out the second pulley is stopped by the loop which connects it to the first, and so on across the river. Then when the car is across the river, the pulleys, at regular intervals all the way across, support the haul cable. A new scheme, however, is being put in operation now for supporting the haul cable. Instead of these pulleys being connected by chains which stop once in so often, they have two wheels geared like bicycles. The cable on which they run will pass between these two wheels, and the speed will be regulated by the rapidity with which these wheels revolve.

The traveler with the highest gearing will come right next to the car itself, and will travel nearly as fast. The one next behind will not be geared quite so high, and will not travel quite so fast as the one in front of it, but a little faster than the one behind. This difference in speed will regulate their relative positions on the cable when the car is crossing the river, and will do away with the long, dangling chains, which were apt to get in the way.

The first thing one notices in looking down into the river-bed is what looks like a long, narrow canal running across the river right under the cable. This is where the new dam will stand when completed. The bottom of this excavation has been filled with concrete, and on top of this the workmen are busily engaged in laying stone for the upper side of the dam. The new dam will on the north or upper side be practically perpendicular, while on the south side it will slope off in a curve, which has been carefully calculated so as to offer the least resistance to the water as it flows over it. At the foot



of the dam, or toe, as it is called, there will be a slight rise, so along at the lowest part there will be a shallow basin.

As can be seen from the illustration, the shell of the dam is to be of block granite filled in with rubblework. The stone for the rubblework has been taken from the river-bed below the dam. The new dam will be 38 ft. high and 54½ ft. wide at the base

The scene along the line of the dam is a busy one. Two or three steam derricks are placing the larger stone, and an engine is at work pumping the water out of a section of the canal, preparatory to putting in the concrete, this section being cut off from the rest of the canal by a coffer-dam of sand bags.

A line of men with wheelbarrows are carrying out sand for the mortar, while overhead rumbles the great car with its load of stone or barrels of cement. There is quite a signal corps used in manipulating this car, by the way. When the car is over on the side opposite Holyoke a man on shore will wave frantically with a red or a white flag to a man on a platform half way across the river, and he, in turn, waves one just as frantically to a man perched up beside the gate-house on the Holyoke side. This man signals with his hand to the engineer, who hoists, lowers, starts, or stops the car accordingly.

Another season will see the wall of the dam rising above the rocks around it, and onlookers will then be able to get a better idea of the work. Then the massiveness of the foundation and the gracefulness of the curve of the south side can be seen and appreciated. The amount of work which will be done this winter will depend somewhat on the weather. Probably granite will be arriving all winter, and if the weather be mild some work will be done on the dam.

There has been some delay because of the difficulty of securing granite of the proper quality, and some carloads have been rejected. But the work is now progressing rapidly, and probably within the allotted time Holyoke's new dam will be completed.

CRACKS IN BRICKWORK AND PLASTERING — WHAT CAUSES THEM, AND HOW THEY MAY BE PREVENTED.

BY A. H. DYER.

(Continued.)

FIG. 15 shows the end wall of a shop building built upon a continuous footing of uniform width. Like all of the previous examples, this is an exact representation of an actual case, and plainly

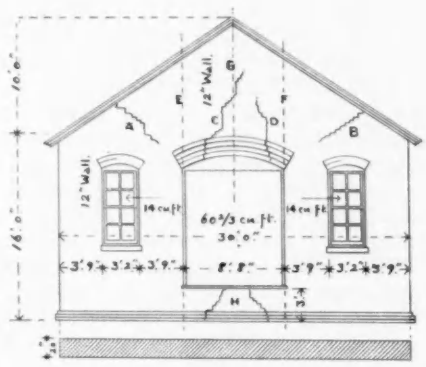


FIG. 15.

shows the usual result of this method of construction; it is, however, entirely different from any of the former examples, inasmuch as it is *not* a case of *too much foundation*. If the entire wall had been built to the uniform height of 16 ft., the footings would not require to be increased at any point, but would need to be cut out below the opening, as shown by Fig. 6; but in this case we have above the center of the large opening a 12 in. wall, 10 ft. higher than the top of the wall at either corner and tapering from the center line to each corner, as shown. The load at the corners is figured at 7⅔ lbs. per square inch, and at this rate the net weight of the brickwork alone (62,070 lbs.) would require a footing of the

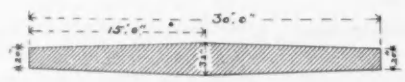


FIG. 16.

uniform width of 20 ins. to be about 33⅓ ft. long, or 3⅓ ft. longer than the width of the building. The footing at lines E and F is already overloaded, even though we assume that the entire area of footings between these lines are loaded in the same proportion as the footings between the opening and the corners; therefore, a "cut out" below the opening would do no good unless the width of the footings be increased near the jamb line of the opening. In the first

place, it would be well to ascertain what area of footings would be required if the entire wall were solid; taking the height of wall at one of the corners, we find the load per square inch to be 7⅔ lbs. with a footing 20 ins. wide; then, taking the height of wall at G, we find that in order to have a load of 7⅔ lbs. per square inch at this point the footing should be approximately 32 ins. wide, and, figuring the *total* weight of the wall (72,000 lbs.) at 7⅔ lbs. per square inch, we find that a footing as shown by Fig. 16 would be practically a

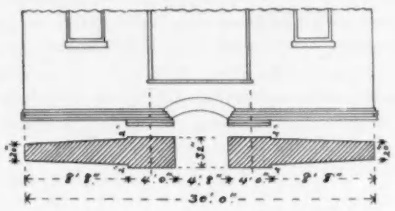


FIG. 17.

uniform one, *provided there were no openings*. But to have a uniform footing for the wall *with* footings we must cut out the center and increase the width of footings at each side of the "cut out," as shown by Fig. 17. Now, to prove that we have made no serious error in our calculations, we will take the total area of footings in Fig. 17, which we find to be 8,064 sq. ins., at 7⅔ lbs. per square inch, and we have 61,823 lbs.; the net weight of the wall after deducting 9,930 lbs. for the three openings is 62,070 lbs., or 246 lbs. more than the above, but, as this is only a slight difference in the aggregate, and also considering the fact that the "cut out" takes out at least that much weight, it will be seen that Fig. 17 has practically the required area of footings for a wall like that shown in Fig. 15.

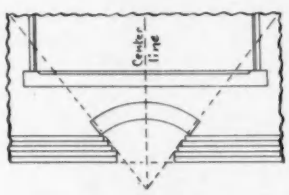


FIG. 18.

It may be noticed that there has been no special reduction made in the footings below the window openings; in this particular case the reduction required would be so little that it would be better not to attempt it in the usual way, but it will be seen that the *total area* of footings is no more than is required to support the *net* weight of wall at the rate of 7⅔ lbs. per square inch. Fig. 17 has an area of 864 sq. ins. more than Fig. 15, and in place of "H" has a "cut out" 4 ft. 8 ins. wide, while the footing at the ends is the same width in both cases. In Fig. 15 no fractures are shown in the vicinity of the window openings, and they do not often occur in a case of this kind unless the openings are quite large or located but a short distance above the footings.

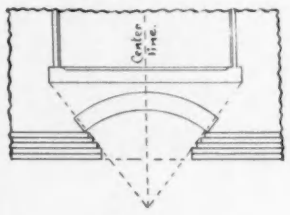


FIG. 19.

Cracks C and D started at the under side of the arch and worked upward, while A and B began at the top of the wall and worked downward, but all of them worked toward the center line.

In cutting out under wide openings that are only a short distance above the footings, care should be taken not to have the sides

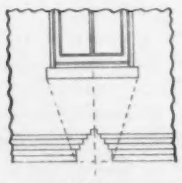


FIG. 20.

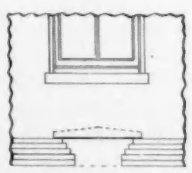


FIG. 21.

of "cut out" too far from the "jamb line," as shown in Fig. 18; but the limit should be as shown in Fig. 19; *i. e.*, a line touching the corners of projections and extending upward as shown should

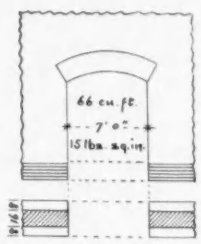


FIG. 22.

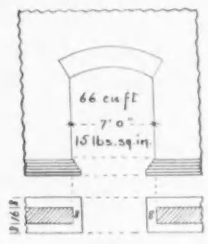


FIG. 23.

clear the end of sill. In Fig. 18 the "cut out" should be made wide enough so that the dotted lines would clear the ends of sill, and then the footing at each side of the "cut out" should be uniformly widened enough to gain the required number of square inches, and in a manner similar to that shown in Fig. 17. Arches over "cut outs" should spring from the top course of footings where practicable, but in case of insufficient room they may spring from bottom course, as shown by Fig. 17, but it would be well to avoid this if possible. In case of a very narrow "cut out," and when there is but little weight directly above it, the footings may be corbeled over the opening, as shown in Fig. 20. For large openings steel "I" beams of suitable size could be used to advantage, or a cast-iron ribbed lintel could be used, as shown by Fig. 21.

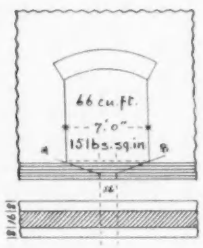


FIG. 24.

The architect or builder who extends the footings full width along the entire area beneath all window openings is very apt to go to the opposite extreme when laying out a basement door opening, whether in an outside wall or a partition wall. Sometimes the footing is cut off on a line with the jamb of the opening, as shown in Fig. 22; in this case (provided the weight of the solid wall gave a load of 15 lbs. per square inch) the area of footings would require to be increased about 2,195 sq. ins. In most cases, however, the footing projects into the opening the same as it does on each side of the wall, regardless of the size of the opening or the width of the footing, and as shown in Fig. 23, in which case the area of footing is 1,664 sq. ins. less than it should be. In many instances the footing is *continuous*, as shown in Fig. 24; by cutting out 16 ins. in width from the center, as shown by the dotted lines, the required area would be obtained, but how much of this area as shown below lines A and B would have a uniform load of 15 lbs. per square inch? The cause of many of the unsightly cracks to be seen in interior or exterior walls may be traced directly to such methods of construction as shown by Figs. 22, 23, 24; if in an outside wall and located very near a corner of the building, either of the above methods will quite frequently afford a fine opportunity to demonstrate the theory of making foundations safe by the use of iron rods.

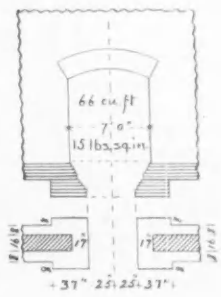


FIG. 25.

Fig. 25 shows a way to provide a uniform footing which may be varied to suit the requirements; for instance, if it is desired to have a finished floor lower the top of upper footing course, the top courses of footings can be even with the jamb line, and the number of courses and projections below be increased accordingly.

(*To be continued.*)

Recent Brick and Terra-Cotta Work in American Cities.

A Department Devoted to the Interests of the Manufacturer.

JUST as a composite photograph is supposed to blend all the character traits in all the many individuals whose negatives are used into one generalized individual whose picture shows none of the extreme markings of any of the individuals, and yet have traces of minute detail to such an extent that the character of each individual can be traced as affecting the resulting picture, so to an extent a modern building, the product of the exertion and effort of thousands of individuals, stands as a stately composite whole, speaking most loudly, indeed, of the individualism of the architect who planned it, whose eyes looked way out into the future and saw it in the trees of the forest, in the ore in the mountain, and in the clay of the valley. Yet, while it speaks in clarion tones of him who penned it, it still has a whisper for each humble worker who honestly and consistently labored for its betterment.

An apt illustration of this is the "Bowlby Building," opposite the Ryan Hotel in St. Paul, just completed, some illustrations from which are here shown. The quick, skilled eyes of the architect, Mr. Cass Gilbert, had looked past and through the shabby buildings that recently cumbered this ground. His mind had gone out far into widely different lines of manufacture. He had considered the products offered and the points in which each product excelled, as well as the uses required, the wishes of the owner, and, in fine, all the necessities of the case. His brain wrought out a scheme of construction that combined strength and durability as well as utility and beauty. Calling then to his aid the well-known contractor and builder, Mr. George J. Grant, and working together, they brought the labor of the miners, smelters, riveters, and smiths as embodied in an iron skeleton, which was in turn covered with the lasting and beautiful sculpture of terra-cotta, combining its artistic lines and delightful color effects as it came fresh from its fiery baptism. The body color of the whole building is just shaded off a white, a very light cream, while at the top story some pure white and a little richer buff is used. In the frieze there are fourteen cherubic figures, finished in colored, shaded glaze. Each of these stands upon a bracket and rests against a colored glazed medallion. Notwithstanding the fact that the whole building had to be put up in a great hurry, it seems to have had none but gratifying criticism, as being at least one of the finest examples of modern construction in the Northwest, and it is more than probable that the fact that all the workers have exhibited an interest in its rapid and skilful completion, with an absence of wrangling over technical points which has made the whole matter a pleasure to all concerned, has contributed not a little to the result.

W. D. GATES.

PHILADELPHIA. — The dwelling builders have had things their own way for the few weeks just passed. There were many operations, and some large ones; but, as usual, there seems to be no desire to improve the dwelling-house architecture of the city by those who build three fourths of the dwellings, — the operative builders.

It would seem that there should be some desire to do better when there are new conditions imposed upon them by the revised building laws and the increased force of inspectors; but there is still the same bad wall, and the usual amount of half-burned bricks are yet to be seen. Artistically, they are worse than before, for some few strive for variety by changing the design (as they call it) every few houses; there will be four with Pompeian fronts, then four with red, and so on in alternation, all of them frightfully bad in design, and capped with the same very cheap galvanized cornice. We fear it will ever be thus.

FRANKLIN BUILDING, PHILADELPHIA;
Furness, Evans & Co., Architects.

In the larger contracts, however, there is a desire for something very much better than usual; and what is even more noticeable is the desire for speed. It no longer takes two years to put up a large building, as was clearly demonstrated in the erection of the Franklin Building, which is now pretty fully occupied, upon a site where eight months ago stood a number of old and very insignificant buildings.

Eight months, however, does not mark the time required for the erection of this building, for it has been ready for occupancy for some time. The demolition of the old buildings commenced on the 12th of last March, the first concrete for the foundations was laid on the 14th of the following April, and the work progressed so quickly from that time until the completion of the building that one could see it grow; and it seemed to grow without much effort, so

well was the work managed. On September 14th one of the stores was occupied for business.

The entire building, from the time of the laying of the first concrete, was completed and thrown open to the public in the surprisingly short period of five months.

It is well erected, thoroughly fire-proof, and equipped with every modern device known to the profession, making it one of the largest and best office buildings in the city.

The building was erected for W. W. Frazier, Esq., is situated upon the corner of Twelfth and Lawson Streets, and is entirely occupied by offices, except the first story, which contains stores; it is constructed from iron, terra-cotta, and cement, the entire fronts being of terra-cotta, which is beautifully modeled, and is the work of Stephens & Co. The caryatids which support the second story are especially effective, and were designed by the eminent sculptor, Carl Bitter; the terra-cotta balcony around the entire building at the fourth floor is also a very nice feature and serves to relieve the monotony of that part of the design. The interior, as before said, is strictly fire-proof, the flooring is of cement concrete and twisted steel rods, a patent construction controlled by the Fire-proof Flooring Co., of this city, while the elevators are the work of Morse, Williams & Co.

To the architects, Messrs. Furness, Evans & Co., is due the credit for the management of the work; it was entirely under their supervision from the beginning, even to the letting of the contracts, which, it is well to say, were all restricted to Philadelphia firms.

This, we think, should go a great way toward removing the untrue stigma of *slowness* from Philadelphia, if we consider the marvelously short time consumed in the erection of such an elaborate building as the one in question. Can cosmopolitan New York or hustling Chicago beat this time record?

The committee to judge the designs submitted for the Museum in Fairmount Park have been appointed, and have accepted; they will report on the 15th of the present month. They are as follows: —

Mr. C. C. Harrison, provost of the University of Pennsylvania.

Architects D. H. Burnham, of Chicago, Stanford White, of New York, and Jos. Wilson, Philadelphia.

Experts not architects, Professor Ware and Mr. J. H. Johnson.

If the park commissioners will allow themselves to be governed by the report of this committee there need be no fear of the proper outcome of the competition.

GUARANTY BUILDING, BUFFALO, N. Y.,
Adler & Sullivan, Architects. Largest all terra-cotta building in America. Terra-Cotta furnished by the Northwestern Terra-Cotta Co.

CHICAGO. — It is to be hoped that all young architects will take an interest in the proceedings of the annual convention of the American Institute of Architects, whether they are members or not. May it be hoped, also, that as a result of such interest and back of this, as a result of the feeling in the profession at large which found expression at the convention in St. Louis, in the papers of Mr. Cook, of Memphis, and Mr. Patton, of Chicago, this year may mark a large stride in the advancement of the architectural profession.

It is enough to make an architect blush with shame to hear architects, themselves above reproach, admit that a majority of the architects in Chicago are not honest men. If it is true (and who doubts?) that there are many men who accept 1 or 2 per cent. for a fee, and then get 5 or 10 per cent. through the contractors, without the owner's knowledge, and if it is true that there are enough bad men in the Institute of Architects to disgrace that organization, then the more pressing the need for good men to exert themselves, join the institute, and help to reform it. Architecture is a learned profession, and it ought to be a dignified one with a strict code of ethics on just as high a plane as law or medicine.

Chicago's activity in building was greater in October than it has been at any corresponding time since the World's Fair. One point lately noted is that the building of single houses for sale and rent is considerably on the increase. Still, it is not easy to perceive that flats and apartment buildings are any less numerous.

The eighteen-story Fisher Building was slow in getting started, but when the steel came it went up like the bean stalk. The open steel skeleton stood fourteen stories high before any masonry walls or floor arches were begun, and then the walls were started in the fourth story first.

The record shows a long list this year of buildings for industrial purposes. One of the best of these noted by the writer is a $100,000 manufacturing building for the Western Electric Company; Treal & Foltz, architects. Laying brickwork in cement mortar was a part of this building not common in Chicago. A good feature, too, is the accommodation of work benches in a series of bay windows which secure fine light and save or gain floor space.

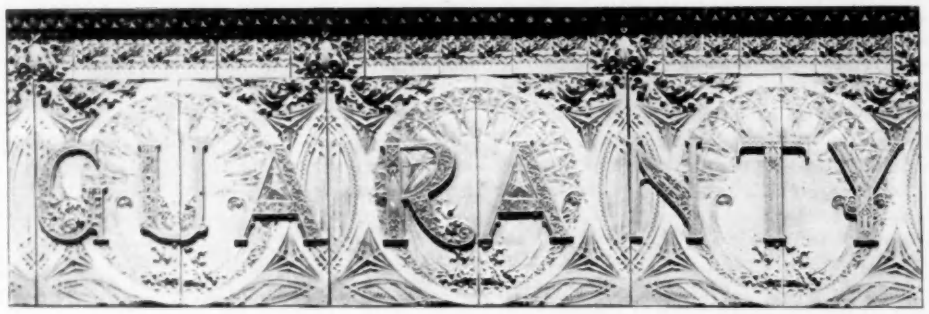
BUFFALO. — There is little new to be said of the realty market from the investment standpoint. The encouraging signs of predicted activity have alone made the market interesting.

The Niagara Falls power negotiations with the city are still in embryo, giving nothing definite to renew confidence in investors.

Shrewd investors are basing calculations upon an early settlement of these power negotiations and tendencies to cause spring developments, and have been carefully selecting their land for a busy spring.

Building at the Falls is principally factories. Syndicates and manufacturers here obtain quite a few options.

Architects report nothing of special interest. The principal plans are new factories and apartment houses, outside of those buildings now in course of erection here enumerated.



TERRA-COTTA DETAILS USED IN THE GUARANTY BUILDING.

House and stable for R. K. Root; cost, $35,000; Staten Island Terra-Cotta Lumber Company's cream brick; McKinn, Mead & White, architects.

House and stable for Charles Williams; cost, $30,000; red brick, white joints; McKinn, Mead & White, architects.

House and stable for J. H. Smith, 76 ft. by 110 ft.; cost, $50,000; Swan & Falkner, architects.

Erie Savings and Loan Association, terra-cotta front; Lansing & Belerl, architects.

Wards H, I, and S, to Buffalo State Hospital; cost, $212,000; Green & Wicks, architects.

Twentieth Century Club; cost, $40,000; Sayre & Fisher salmon pink brick; Green & Wicks, architects.

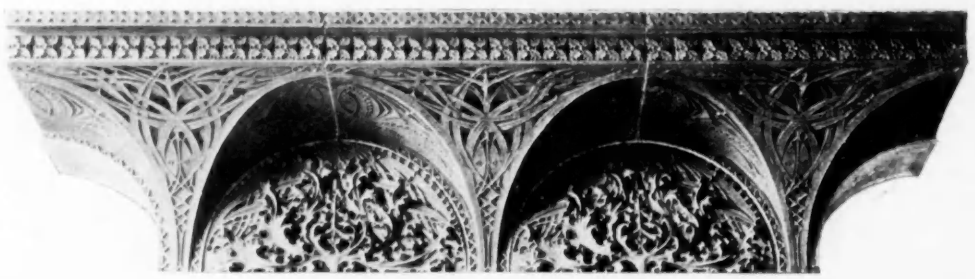
Lafayette Church; brown sandstone; Lansing & Belerl, architects.

Fuchs Building; Hydraulic Company's brick; Bethune, Bethune & Fuchs, architects.

Mrs. White's residence; Sayre & Fisher cream brick, white terra-cotta, Northwestern Terra-Cotta Company; George Cary, architect.

Marlborough Flats; cost, $20,000; cream brick and dark red terra-cotta trimmings; F. W. Humble, architect.

House and stable for Mrs. Violetta Pierce (frame and shingle), colonial; cost, $24,000; Green & Wicks, architects.



TERRA-COTTA DETAILS USED IN THE GUARANTY BUILDING.

Public School No. 58, competition; cost, $45,000; August Eisenwein, architect.

Public School No. 23, competition; cost, $45,000; F. W. Caulkins, architect.

ROCHESTER. — The outlook for further building operations this fall is rather blank. Not many new jobs are on the boards in any of the offices, and it looks as though brickbuilders will have to content themselves with building brick chimneys until next spring, when it is expected that they will be treated to something better.

Messrs. Ellis Bros. and Kelly & Headley are preparing plans for manufacturing buildings which will not be built until spring.

Mr. F. A. Brockett has just let contracts to Ford, Welsh & Kenny for the erection of a three-story brick store building, to be built on Monroe Avenue. New York Hydraulic-Press Brick will be used.

Messrs. Fay & Dryer, architects, have let contracts to Chambers & Casey for the erection of a four-story manufacturing building, to be built for Proctor Estate, and to R. Kreigh for the erection of a three-story store building, to be built on Lyell Avenue, and are about to let contracts for a residence for Mr. R. D. Richards, to be built on Buckingham Street. New York Hydraulic-Press Brick will be used in first story, and also on fronts of the other buildings.

C. F. Crandall, architect, has let contracts to Stallman Brothers for a five-story manufacturing building, to be built on Elizabeth Street; Sturtevant system of heating and ventilation, press-brick, etc., slow-burning construction. All interior walls are of brick, and the building generally will be one of *the* best manufacturing buildings in the city, and every appliance and all materials will be of the very best.

Mr. Oscar Knebel, one of the best-known architects in the city, has been nominated for member of the executive board, and it is hoped by architects and builders that he will be elected, as it would probably help in changing the poor system of letting public work to the "architect with the pull." Mr. Knebel has been nominated by both the Good Government Club and the Democratic Party.

DETROIT. — The county auditors have advertised for proposals for the new jail and sheriff's residence. These gentlemen may think they are guarding the interests of the tax-payers, but if their scheme is carried out it will look very much like a case of boodling.

In the first place, only prison-builders are invited to compete for the new building to cost $150,000.

There is no such trade in the United States as prison-builders, that is, firms who make a specialty of prison-building. There are manufacturers of jail cages, but they do not enter into the architectural features of the building.

And in the second place they are to specify Portage Entry or Berea stone; both of these stones are represented by the Malones, of Cleveland, O.

Each bidder bases his proposal on his own plan, so the adopted plan has only one bidder. It is required that each bidder deposit a certified check for ten per cent. of the amount of his proposal. This will shut out some competent contractors.

The advertisement reads that "no commission will be paid for

plans." No firm should hold the position of architect and contractor.

It is well the matter is being looked into, as we are about to build a $1,000,000 court-house in addition to the jail.

Their defense is that they have had a number of exclusive jail-builders before the board before they had advertised.

Now, A. L. Bours has stated in a daily paper that he will pay one dollar each for the names of exclusive jail-builders. They then refer to one, the Pauly Jail Building & Manufacturing Co. Mr. Bours in response says, "There is one Pauly, an architect who has a brother that superintends the manufacture of jail cages and other articles of iron." So if the supervisors desire to clear themselves of any suspicion, they should adopt the customary methods.

Not only is curiosity aroused by the rapidity with which Mabley & Co.'s new fourteen-story building progresses, but the peculiar method of building the walls of a large building entirely of hollow terra-cotta, new to Detroit.

A gentleman was heard to remark that he would not have an office in that building if he were to get it free. Little need he worry; offices will not be offered free, neither is the building going to fall, as it is constructed of the best material that could be used for that purpose.

The terra-cotta is furnished by the Northwestern Terra-Cotta Co. They are now only up to the seventh floor with the steel, and to the fifth with the terra-cotta; still, the building is to be closed in by January 1.

The Goebel Brewing Co. will build a new brewery 45 by 200 ft., five stories high, surmounted by an ornate tower of brick and marble; in addition to this they will build a new wash-house and bottling works.

E. A. Walshe & Son have plans for a factory and office building to be erected by the Universal Elevator Co.

Architect A. C. Varney has made plans for a handsome press brick block for D. J. Campau, corner of Cass and Michigan Avenues.

Arthur E. Clark, representing the United Alkali Co., which is a combination of half the companies in England, has been looking over the salt district and obtaining options on a large tract of property. It is announced that the present plan of the trust is to do some extensive building in that district. The company is capitalized at $42,000,000, and if they establish themselves at Detroit practically all the manufactures of Europe will be represented here.

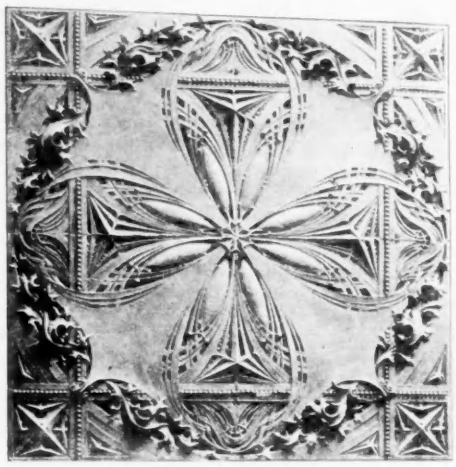
Messrs. W. H. Ashwell & Co., architects, have completed their plans for a system of water works and electric lighting plant for the log cabin subdivision; work of construction will be commenced at once; buildings constructed of brick, including a reservoir of one hundred thousand gallons capacity; bricks of reservoir to be laid in cement mortar.

John Scott & Co., architects, are making the plans for the new Women's Gymnasium for the State University, which will cost about $70,000; also a $20,000 residence for Dr. Mortimer Wilson.

MINNEAPOLIS.—The Chamber of Commerce will soon be ready for occupancy again, repairs having been pushed under supervision of Contractor Haglin.

The masonry of our new city hall and court-house was completed October 26, the last stone being laid at 4.31 P.M., in presence of the architects, superintendent, contractors, and commissioners, with appropriate ceremonies and subsequent "liquidation." I shall give you a complete description of this great undertaking in a short time. Nothing remains to be done externally, but the apex of tower, which will be of iron, terra-cotta, and tiles, reaching to a total height of 340 ft. above street grade.

The Architectural Sketch Club is holding an exhibit at present of drawings, sketches, etc., with THE BRICKBUILDER competition drawings for a city residence as a nucleus. After scouring the local architects' offices, about two hundred sketches were "dug up," which make an extremely artistic and satisfactory display of the abilities of our various offices and has attracted considerable attention from the public. Mr. S. J. Hewson, general manager of the Northern Hydraulic-Press Brick Co., tendered the club the use of his display room for this exhibit, and has also generously offered the use of same during the coming winter for their classes and meetings. The result will undoubtedly be a thorough reorganization of the club for some good and profitable work this winter. It is the intention to hold a general exhibition before next spring of the club's efforts in the way of studies for fireplaces, city fronts, terra-cotta detail, etc. There are enough draftsmen of ability here to insure a good showing.



TERRA-COTTA DETAILS USED IN THE GUARANTY BUILDING.

The State Capitol Commission has finally decided upon an architect for the new capitol building, having chosen Mr. Cass Gilbert, of St. Paul, for the position, a decision that meets with hearty approval with the profession generally and assures us a structure skilfully planned, constructed, and designed. After two competitions and the submission of ninety-seven different designs, the commission has selected a plan, which they will, of course, alter considerably before a satisfactory result is attained. Here is an excellent example of the competition evil. Although fifty-six designs were submitted in the first competition, none were deemed worthy of execution, although there were designs there fully as worthy as those given prizes in this second competition, as is freely conceded. Politics seemed to rule, also the inevitable "pull," and the result is doubly satisfactory, when one considers what a poor choice might have been made.

Work will be pushed on the foundations as soon as spring opens, and it is expected that the superstructure will be under way before next fall. Geo. Mann, of St. Louis, drew second prize; Traphagen & Fitzpatrick, of Duluth, third prize; Clarence H. Johnston, St. Paul, fourth prize; and Harry W. Jones, of Minneapolis, fifth prize.

OF INTEREST.

MESSRS. MEEKER & CARTER have recently taken orders to furnish architectural terra-cotta for the following buildings: Ayer Building, Broadway and Leonard Street; Wadsworth Building, Union Square; and apartment house, 75th Street and Columbus Avenue, New York City, and public school No. 110, Brooklyn.

THE GRUEBY FAIENCE COMPANY, whose new advertisement appears on page xx, furnished twenty-one faience mantels executed from original designs for "The Bolkenhayen," Fifth Avenue and 58th Street, New York City, of which Alfred Zucker is the architect. These mantels contain some very fine work in two colors, and have been the object of much admiration.

VALUABLE information to the readers of THE BRICKBUILDER regarding clay deposits, brickmaking machinery, locating, erecting, and equipping press brick plants may be had by addressing the "Kulage Machine Works," on College Avenue and North Broadway, St. Louis, Mo. The celebrated "Triumph" Press, which is said

to be the most perfect and successful dry clay brick press in existence and upon the market, and the "Triumph Gathering and Loading Machine" are manufactured by the Kulage Machine Works.

MESSRS. E. A. PHILLIPS AND A. PENTECOST, architects, have associated themselves under the above style and taken offices in the Fornes Building, Buffalo. They will make a specialty of heavy construction and building requiring mechanical skill. Catalogues are desired.

THE TIFFANY PRESSED BRICK COMPANY have secured the large contract for the new Century Building, St. Louis, Mo.

They have recently received the following most flattering indorsement for their enameled bricks: —

CHICAGO, Sept. 28, 1895.

J. VAN INWAGEN, ESQ.,
President Tiffany Pressed Brick Co., Chicago.

Dear Sir,— We have used large quantities of the "Tiffany" Enameled Brick and believe them to be, in quality and finish, fully equal to the best English product. We have found it an especial convenience to be able to obtain special shapes without delay.

Very truly yours,
ADLER & SULLIVAN, *Architects.*

THE art of brickmaking has been so perfected that, by the means of their machinery, the "Kulage Machine Works," located on College Avenue and North Broadway, St. Louis, Mo., claim to be able to produce the finest and highest grade of pressed front and face bricks at *less cost* than the average cost of common slop or mud bricks. The readers of THE BRICKBUILDER may profit by asking for further information direct to the Kulage Machine Works.

MESSRS. MEEKER & CARTER have been appointed sole agents for the American Enameled Brick Company, and will handle their entire output, which amounts to over two million bricks per year. These bricks have met with an unqualified success and are being specified by many prominent architects.

Brickmakers, Your Interest

demands of you that you peruse the following

Announcement:

WE manufacture the Kulage Brick Press, which is the celebrated "Triumph" Dry Clay Press Brick Machine.

We guarantee that this press has not its equal. The "Triumph" has a capacity up to 35,000 plain or shaped pressed bricks in ten hours — has four distinct or quadruple pressures — has solved the problem of a twin, or top and bottom pressure without the center seam streak or granulation; is simpler — stronger — and built upon better scientific principles than any other dry clay brick press on the market. The price of a "Triumph" press is $5,500, which entire amount may be saved or gained during the first year in the superior quality of its product, capacity, and economy of operation, and comparing same with other presses.

We construct and equip brick plants of any capacity complete, and in this connection would say that we manufacture the "Triumph" Gathering and Loading Machine — also a money-maker for the brickmaker. This machine gathers the previously plowed and dried clay from the field, and loads same into carts or wagons. With two or three horses and one driver, its capacity is the gathering and loading of as much clay as twenty men with shovels would do. The profits and advantages obtained by the use of this machine are enormous.

Valuable information for progressive brickmakers — capitalists — and syndicates may be had by addressing:

Kulage Machine Works,

College Avenue and North Broadway, St. Louis, Mo.

HERE IS ONE

Representation of a FIREPLACE MANTEL. Our Sketch Book, containing 39 others, will be sent you on application.

JUST THE THING

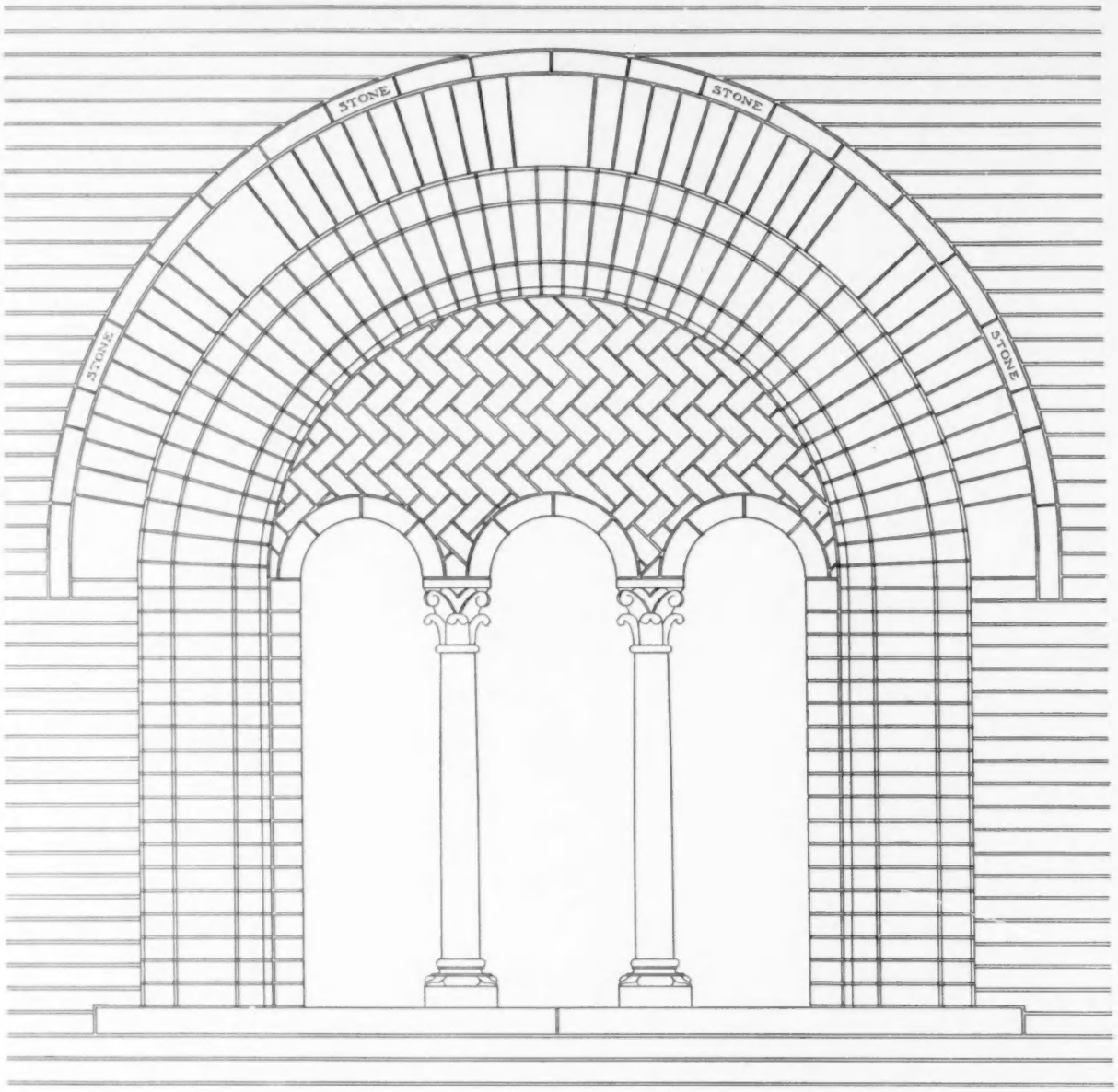
FIREPLACE MANTELS

MADE OF MOULDED BRICK

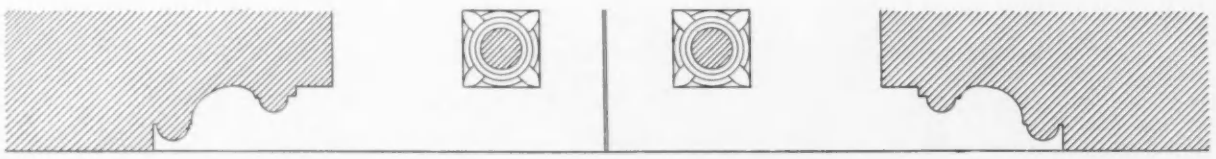
In such Colors as Red, Cream, Buff, Pink, Brown, and Gray. These Mantels cost no more than other kinds, but are far better. They are easily set, and have a richness and simplicity of effect which is decidedly pleasing.

PHILA. & BOSTON FACE BRICK CO.,

No. 4 LIBERTY SQUARE, BOSTON, MASS.



ELEVATION



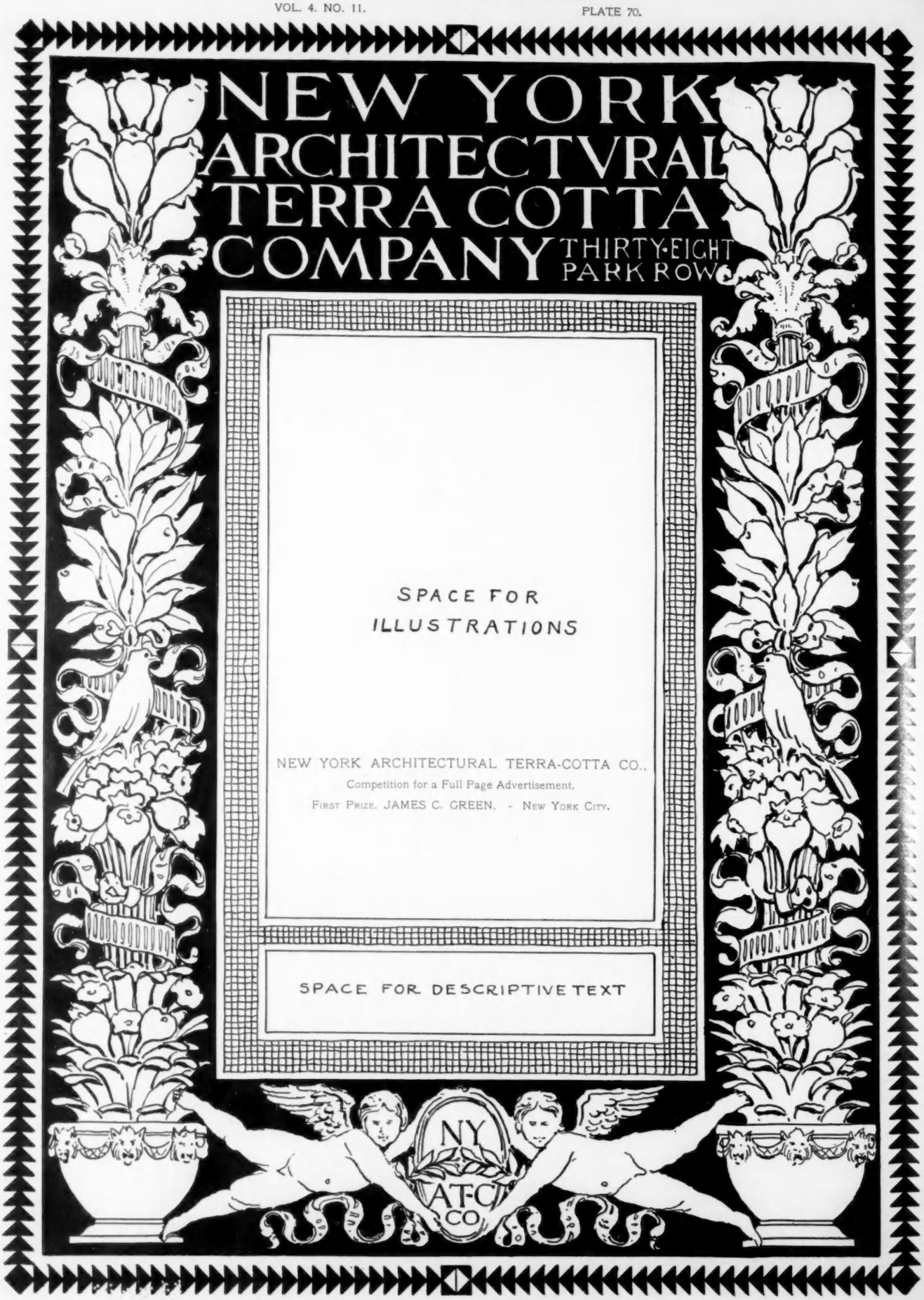
PLAN

SCALE

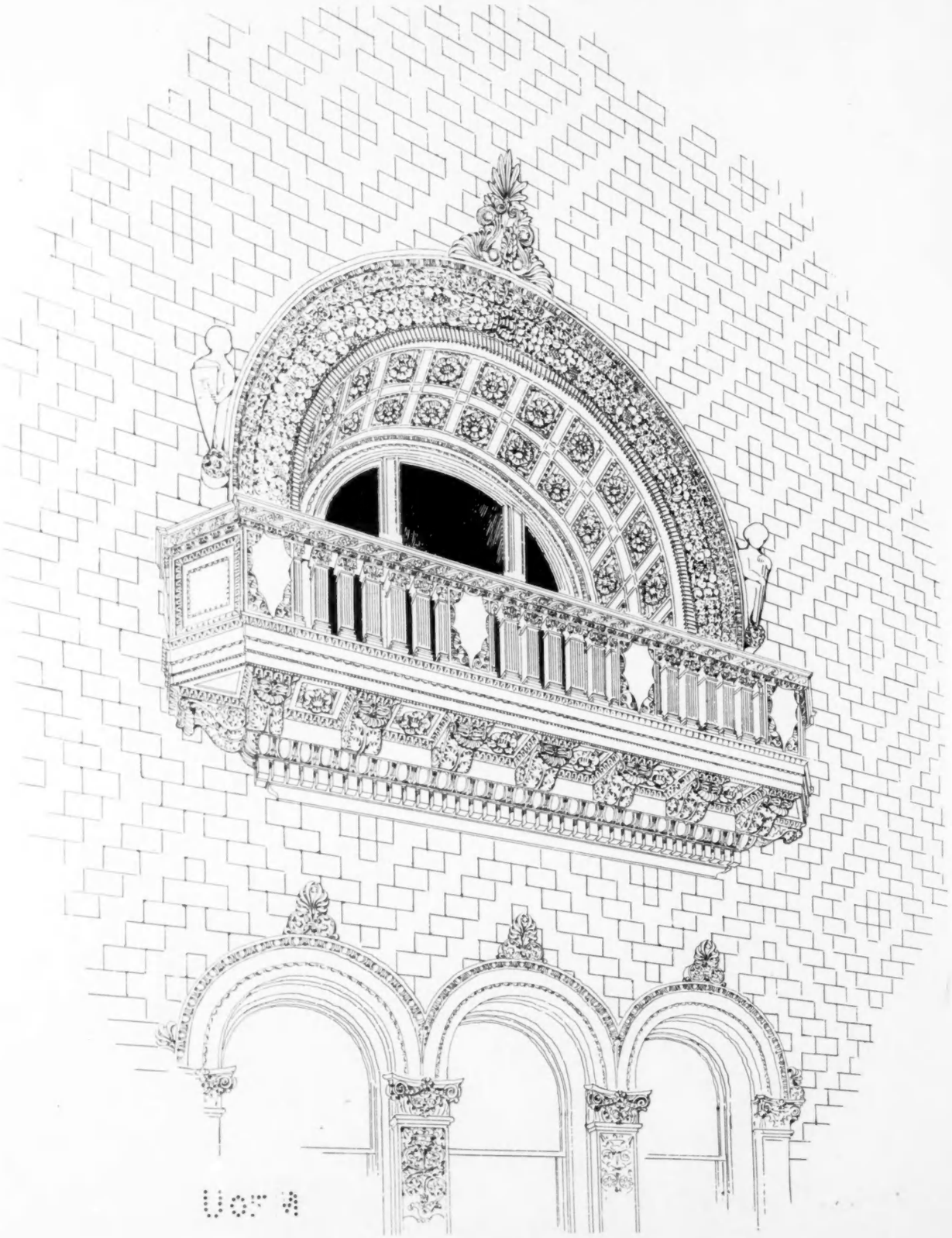
NOTE. VOUSSOIRS BRICK AND SANDSTONE.
COLUMNS AND SILL STONE.
ALL OTHER WORK NOT MARKED DIFFERENTLY, OF BRICK.

MEASURED DRAWING OF WINDOW IN SOUTH SIDE OF MUNICIPIA MONZA, THIRTEENTH CENTURY.

THE BRICKBUILDER.

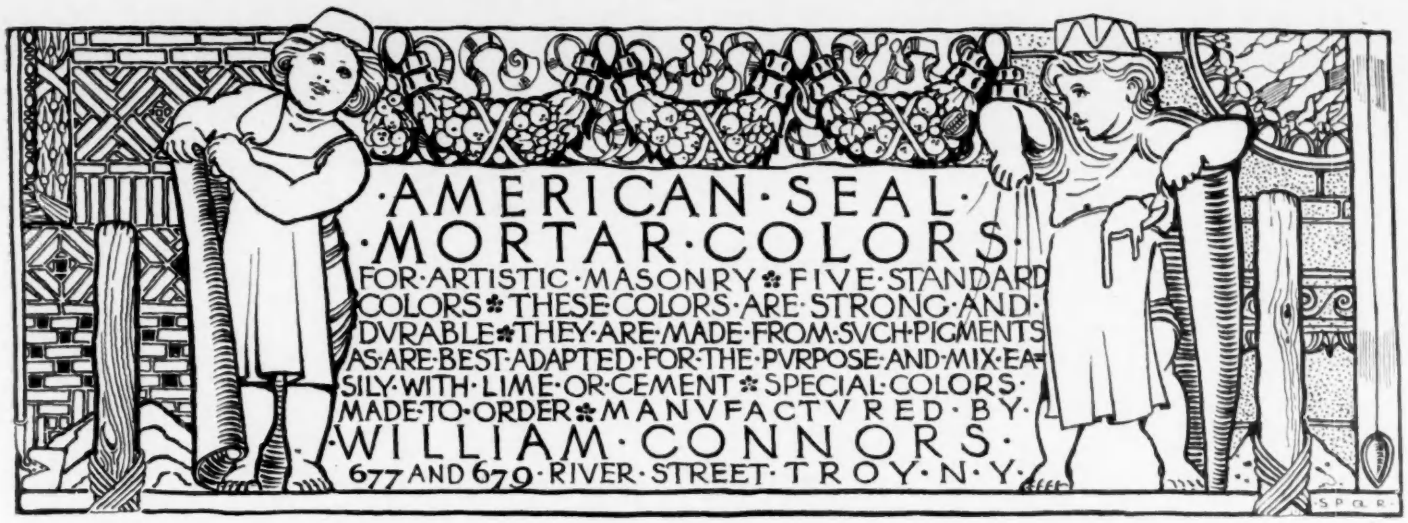

NEW YORK
ARCHITECTVRAL
TERRA COTTA
COMPANY
THIRTY-EIGHT
PARK ROW
SPACE FOR
ILLUSTRATIONS
NEW YORK ARCHITECTURAL TERRA-COTTA CO.,
Competition for a Full Page Advertisement.
FIRST PRIZE, JAMES C. GREEN, - NEW YORK CITY.
SPACE FOR DESCRIPTIVE TEXT
NY
AT-C
CO

ELEVATION OF OFFICE AND STORE BUILDING, CORNER WINTER AND TREMONT STREETS, BOSTON.
WINSLOW & WETHERELL, ARCHITECTS.

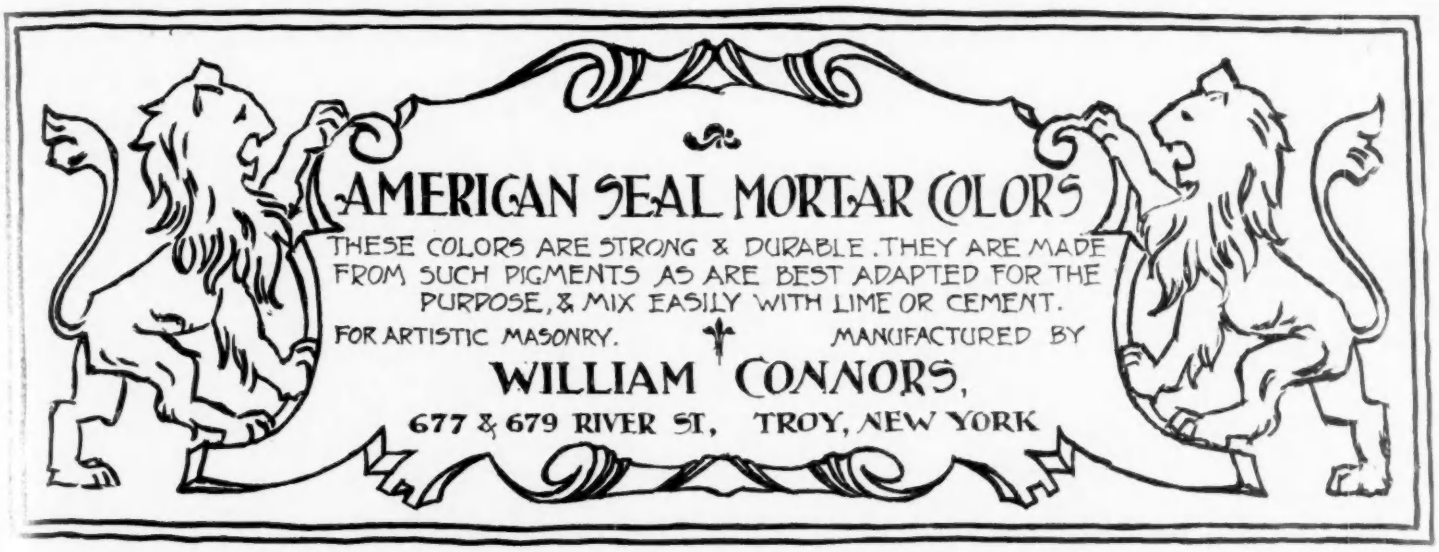


CENTRAL BALCONY, TREMONT TEMPLE, BOSTON.

BLACKALL & NEWTON, ARCHITECTS.


AMERICAN SEAL
MORTAR COLORS
FOR ARTISTIC MASONRY ✿ FIVE STANDARD COLORS ✿ THESE COLORS ARE STRONG AND DVRABLE ✿ THEY ARE MADE FROM SVCH PIGMENTS AS ARE BEST ADAPTED FOR THE PVRPOSE AND MIX EASILY WITH LIME OR CEMENT ✿ SPECIAL COLORS MADE TO ORDER ✿ MANVFACTVRED BY
WILLIAM CONNORS
677 AND 679 RIVER STREET TROY N Y
SPAR

First Prize, PIERRE A. LEISCH, Boston.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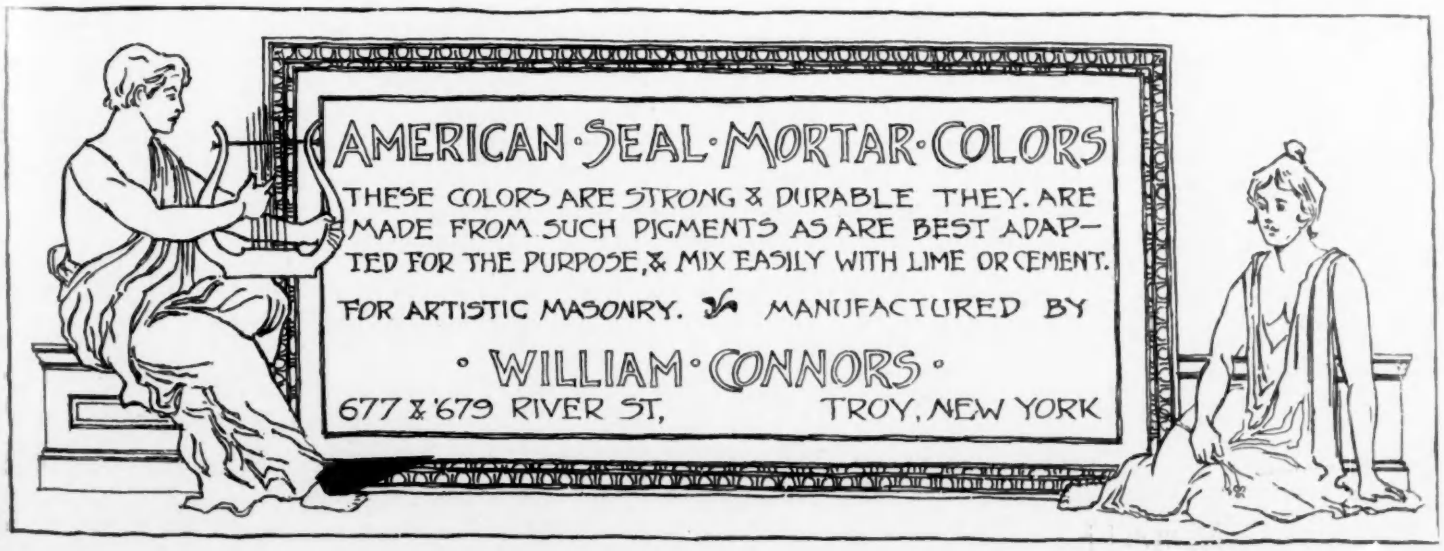
FOR ARTISTIC MASONRY. MANUFACTURED BY
WILLIAM CONNORS,
677 & 679 RIVER ST, TROY, NEW YORK

Second Prize, H. F. LEHR, Allentown, Pa.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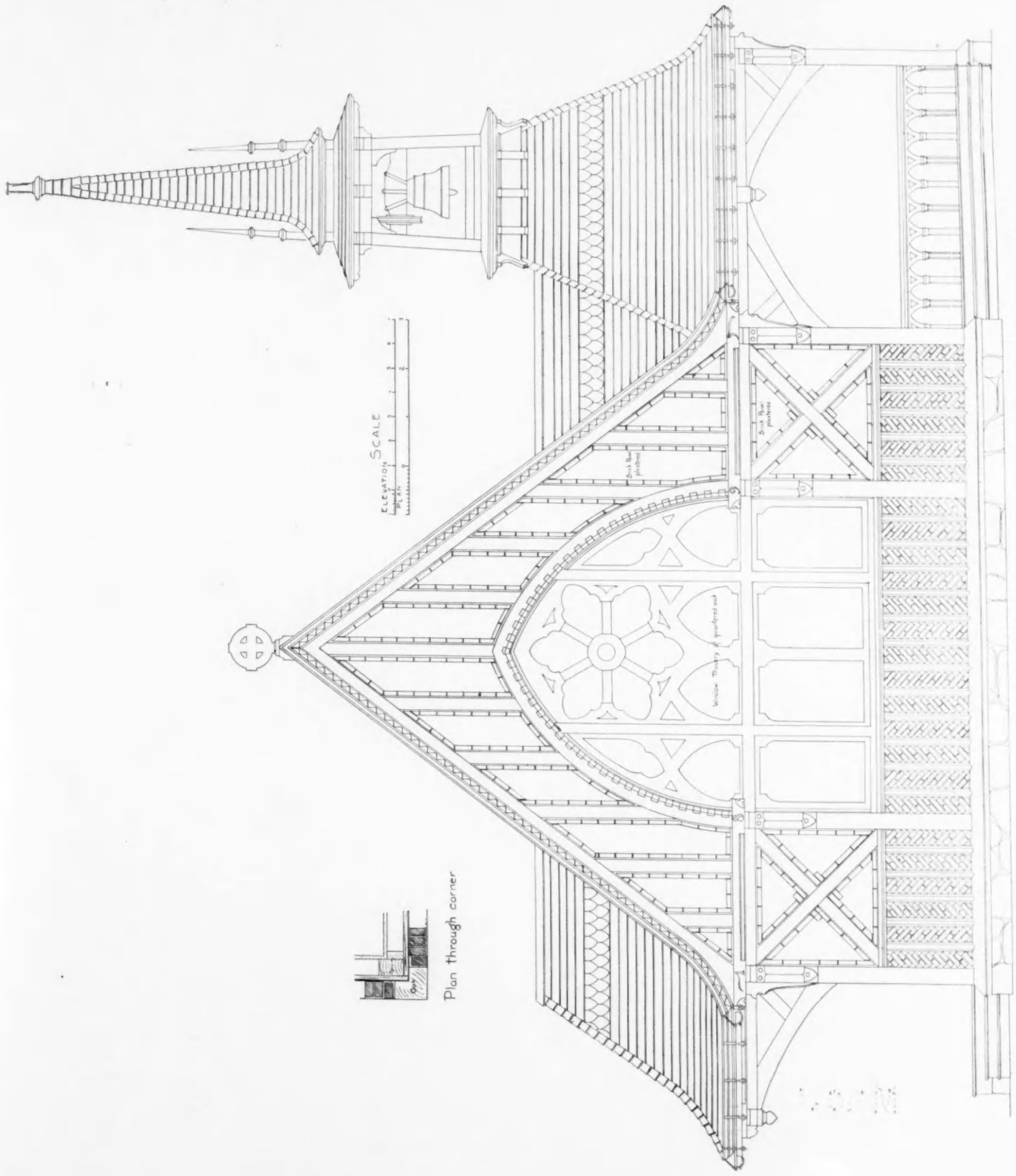
WILLIAM CONNORS
677 & 679 RIVER ST, TROY, NEW YORK

Third Prize, CHARLES WIERBACH, Allentown, Pa.

WILLIAM CONNORS' COMPETITION FOR AN ADVERTISEMENT DESIGN.



UNITARIAN CHURCH, MANCHESTER, MASS. BRICK AND HALF-TIMBERED CONSTRUCTION.

COOLIDGE & WRIGHT, ARCHITECTS.